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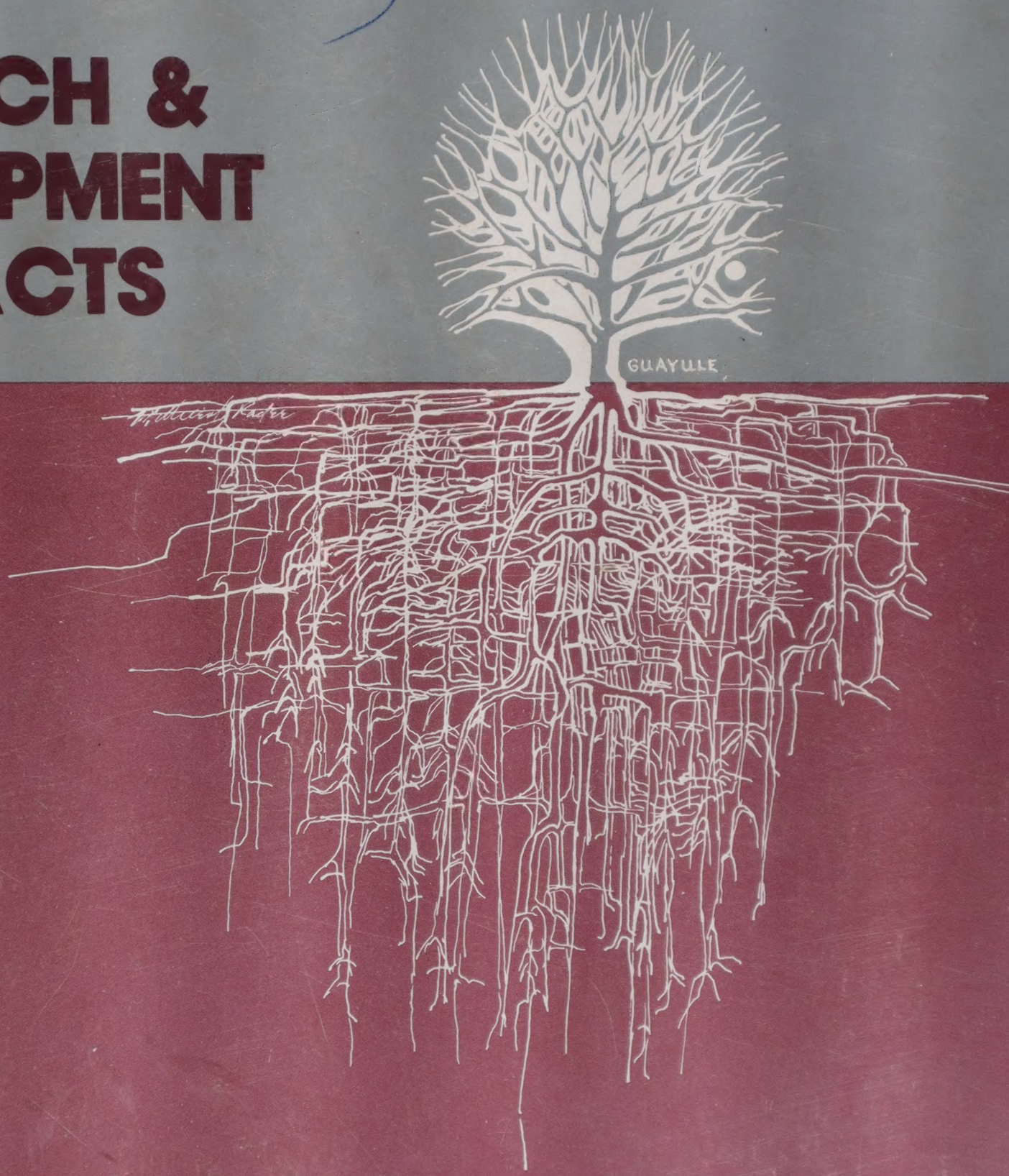
C.F.T.R.I., MYSORE

A.I.D. RESEARCH & DEVELOPMENT ABSTRACTS



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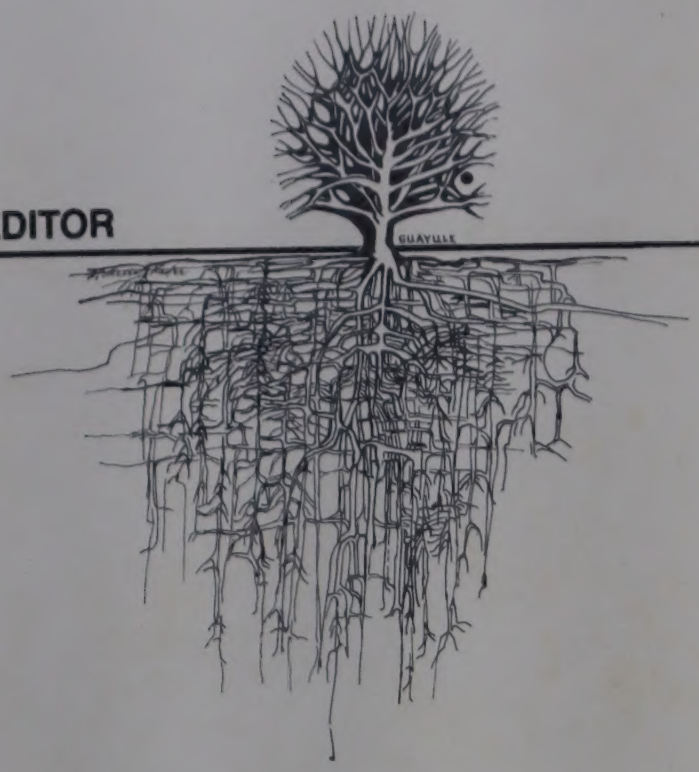
Volume 9, Number 1, February 1981
TN-AAA-031



Guayule, *Parthenium argentatum*

The cover design for this issue of ARDA illustrates a little known, but increasingly interesting plant — guayule. Guayule is a single-stemmed shrub normally reaching 2–3 feet in height with crooked, brittle branches, grayish-green leaves, and inconspicuous yellow flowers on short slender stems. Although rather fragile as a seedling, once established against competing growth, this unusual plant's adjustment to varying soil moisture conditions is remarkable. Following brief periods of rain, guayule will revive from several years' dormancy brought on by little or no rainfall. Guayule can send down tap roots to depths of 20–30 feet and, where the water table is more superficial, will concentrate massive lateral root systems between successive horizontal layers of clay and silt typically found in desert sands.

Growing wild in the Southwestern United States and Central and Northern Mexico, guayule originally became known for its rubber content which, intriguingly, is increased during low moisture conditions. The rubber, resins, and other chemicals extracted from this plant have been used over the centuries by Aztec Indians to fashion rubber balls for games; later by Mexicans to fire smelters and to heat bread ovens; by American, Mexican, German, and English companies for commercial exploitation; by the United States in World War II when supplies from Southeast Asia were cut off; and most recently, as less expensive substitutes for products normally refined from petroleum. Involved at one time or another in U.S. commercial development of guayule were such captains of American industry as Thomas Edison, Bernard Baruch, Meyer Guggenheim, and John D. Rockefeller, Jr. In 1930, a then-obscure Army Major, Dwight David Eisenhower, coauthored an exhaustive, investigative report which predicted annual production of 160 million pounds of rubber and creation of a strategic reserve of 250 million pounds from 400,000 acres. During World War II, the U.S. Congress authorized 500,000 acres for the Emergency Rubber Project of which only 32,000 were planted during the life of the project. After just three and one-half years of operation, data confirm that this scaled-down project resulted in not only 3 million pounds of rubber during the war, but also 21 million pounds in unharvested bushes that were destroyed in 1946. Today, using modern genetic engineering and production technology, those original 400,000 acres would yield nearly 700 million pounds of rubber over a 3-year growing cycle and more than a billion pounds with a 6-year growing cycle.

With a worldwide rubber market estimated at $14 billion for 1980, the continuing escalation of petroleum costs, the increased demand for rubber products in developing nations as they industrialize, the loss to settlement of marginal lands where guayule grows best, and the yield increases possible through modern technology, other governments may soon follow the United States and Mexico in appropriating financial, planning, management, and production resources to develop guayule's bounty.

For additional information on guayule, see item numbers 012, page 6, and 017, page 8.

PHOTO CREDITS: A.I.D. photos, pp. 13, 18, 23, 47, 49, 52, 53, 55, 56, Inside Back Cover. **World Bank photos, pp.** 3, 30, 31, 43.

24 APR 19
C.F.T.R.I., MYSORE

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SUBJECTS AND DOCUMENTS OF SPECIAL INTEREST

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Fertilizer 021-025, 059, 062, 076
Plant Diseases 046-061
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International Rice Research Institute Research Paper Series 003-009, 025, 057, 058
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Kansas State University Food and Feed Grain Institute
Grain Storage, Processing, and Marketing Research Reports 001, 002, 018
Papers of the East-West Population Institute 118, 119, 123, 124, 131, 132, 141, 147
Plant Disease Reporter 051-053, 055, 056
Second International Conference on Rural Finance Research Issues 059, 079-091
University of Minnesota,
Department of Agricultural and Applied Economics
Staff Papers Series 015, 016

DOCUMENTS AVAILABLE IN SPANISH AND FRENCH:

Spanish: 031, 104, 105, 139
French: 148

QUESTIONS AND ANSWERS ABOUT ARDA

What is ARDA?

ARDA, "A.I.D. Research and Development Abstracts", is a quarterly abstract journal issued by the Division of Documentation and Information, Office of Development Information and Utilization, Bureau for Development Support.

What is the goal of ARDA?

The goal of ARDA is to transfer development and technical information to active practitioners in development assistance.

For whom is ARDA published?

ARDA's target audience is A.I.D. staff worldwide and selected key institutions in developing countries. Such institutions are government agencies, universities, libraries, research organizations, and other public and private sector organizations.

What materials are abstracted in ARDA?

ARDA presents abstracts of A.I.D.-funded current and less recent research studies, state-of-the-art reports, sector analyses, special evaluations, and other documents which, taken together, describe a broad spectrum of international development experience.

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All major A.I.D. offices in AID/W and in the field receive ARDA regularly and automatically, along with other information outputs.

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How can full texts of titles abstracted in ARDA be obtained?

A series of order forms are supplied at the back of each issue of ARDA. These forms include instructions which explain how copies of materials in ARDA may be ordered, and they explain the limitations on the number of titles and pages that may be ordered. Each order must carry the recipient code for the institution and the publication number (PN) of titles ordered.

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AID/W staff and USAID Missions may order an unlimited number of materials at no cost in either paper or microfiche. Only A.I.D. staff may order paper copies of documents more than 300 pages long.

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What formats are available for full texts?

Most titles included in ARDA may be acquired in paper copy. All titles are available, however, on negative diazo microfiche.

All USAID missions and developing country institutions with access to microfiche readers with 24x magnification should order documents on microfiche.

USAID missions can build up complete microfiche libraries of A.I.D. publications by either subject classification or by geographic region. Missions desiring more information on documents available to them on microfiche or on microfiche equipment should write to the Editor of ARDA.

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QUESTIONS ET REPONSES RELATIVE À ARDA

Qu'est-ce qu'ARDA?

ARDA, "A.I.D. Research and Development Abstracts" (Résumés sur la recherche et la développement de l'Agence pour le Développement International), est une revue trimestrielle composée de résumés publiée par la Division de la Documentation et des Informations, Bureau des Informations sur le Développement et leur Utilisation, Bureau pour le Soutien au Développement.

Quel est l'objectif d'ARDA?

ARDA cherche à transmettre les informations techniques et axées sur le développement aux techniciens participant à l'assistance au développement.

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ARDA s'adresse au personnel d'A.I.D. dans le monde entier et aux institutions clés choisies, situées dans les pays en développement. Des institutions de ce genre sont des organismes publics, des universités, des bibliothèques, des organisations de recherche, et autres organisations des secteurs public et privé.

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PREGUNTAS Y REPUESTAS SOBRE ARDA

¿Qué es ARDA?

ARDA, "A.I.D. Research and Development Abstracts" (Sumarios de Investigación y Desarrollo de A.I.D.), es un periódico trimestral publicado por la División de Documentación y Información, la Oficina de Desarrollo Información y Utilización, el Despacho de Apoyo al Desarrollo.

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El objectivo de ARDA es el de transmitir información técnica y de desarrollo a trabajadores activos en asistencia de desarrollo.

¿Para quién se publia ARDA?

La audiencia blanco de ARDA consta de los funcionarios de A.I.D. en el mundo entero y de los instituciones claves seleccionadas en los países en desarrollo. Tales instituciones son agencias de gobierno, universidades, bibliotecas, organizaciones de investigación y otras organizaciones del sector público y privado.

¿Qué materiales son condensados en ARDA?

ARDA presenta extractes de estudios de investigación corrientes y menos recientes consolidados por A.I.D., informes del estado del arte, análisises del sector, evaluaciones especiales, y otros documentos que, juntos, describan un espectro ántlio de experiencia de desarrollo internacional.

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SAMPLE DOCUMENT CITATION AND ABSTRACT

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Numéro de l'article
Número de articulo

133

Publication number
Numéro de la publication
Número de publicación

PN-AAH-900

A REFERENCE COMPILATION OF SCIENCE AND TECHNOLOGY OFFICIAL DEVELOPMENT ASSISTANCE FURNISHED BY A.I.D. FOR THE LESS DEVELOPED COUNTRIES (LDCs)

Title
Titre
Titulo

Personal Author(s)
Auteur Individuel
Autor Individuel

Reynolds, A.; Gaithwright, T.

Corporate Author(s)
Auteur Corporatif
Autor de Corporación

Logical Technical Services Corporation.

Document date and page numbers
Date et nombre de pages du document
Fecha y número de páginas del documento

1980, 88 p.

Prepared for the United Nations Conference on Science and Technology for Development

Supplementary note
Nota supplémentaire
Nota suplementaria

Abstract
Résumé
Sumario

This research report, summarizing official development assistance provided by A.I.D. to LDCs, was produced to meet the needs of participants in the United Nations Conference on Science and Technology for Development. It represents a synthesis of A.I.D.'s economic assistance philosophy, which is characterized by a two-fold thrust: (1) a "basic human needs" approach to bilateral development assistance, which combines the furthering of U.S. interests abroad with U.S. humanitarian interest in that quarter of the world's population condemned to live at a substandard level; and (2) a refocussing of A.I.D.'s assistance to LDCs from sophisticated technology to light capital, labor-intensive applications of scientific and technological developments. The report concentrates on development assistance in the fields of health, nutrition, and population; energy and natural resources; employment, trade and industrialization, and access to technology; food, climate, soil, and water; and urbanization, transportation, and communication. In each case, the relevant technologies and means of technology transfer are discussed in conjunction with a statement of the development problem addressed by these technologies and with illustrative examples of A.I.D. programs. The report concludes that comparatively little U.S. technology can be transferred to LDCs without significant adaptation. The LDCs have become aware of the need for technologies tailored to fit their resource endowments and absorptive capacities, and stress is being placed on the development of more appropriate technologies as well as on devising policies and institutions permitting LDCs to make better technological choices. An extensive subject index is included in this report.

Project number
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Also available in French: PN-AAG-000, 88 p.

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001 PN-AAG-989

DEVELOPING AN APPROPRIATE GRAIN STORAGE SYSTEM

Anderson, D.G.
Kansas State University, Food and Feed Grain Institute.
1978, 50 p.

Prepared for the West African Community Workshop on Improved Grain Storage

Grain storage problems in LDCs are becoming increasingly critical. This document discusses this subject by presenting a computerized model for storage planning which was developed by Kansas State University. Since the model is complex, the document's focus is on offering general guidelines in the areas of storage facility size, location, type, and pricing. In regard to storage size, areas must be able to handle possible import requirements and crop surpluses during low supply periods. Higher grain volume can make large facilities feasible, which, due to economies of scale, can be very efficient. Improving transportation can also reduce costs and therefore make large storage centers feasible. Temporary and dual facilities should be used during excessive harvest periods and existing systems should be considered when evaluating new system needs. Finally, an even grain flow between producers and consumers can reduce storage needs. Storage location should have access to least-cost modes of transportation. Before selecting a location, storage and processing costs at various sites should be compared and new facilities should be meshed with existing structures. Local needs and storage costs should be compared with the options of exchanging grain with other localities that have different harvest periods. Sites should be in areas where the climate is favorable and suitable for commercial drying when this is needed. The placement of sites near consumers can prevent shipping problems, yet a decentralized system does diminish the advantages of attaining economies of scale. When considering the facility types, long-term storage sites require the installation of better grain protective measures than do short-term systems, yet their receiving and loading areas can be less efficient. Also, local building inputs should be used and the facility must be matched with the rest of the system. The design of multi-use facilities can reduce costs. Finally, pricing policies must consider the values created by storage, transportation, and processing in order to promote timely and correct investments which will affect the entire system.

AID/ta-C-1162 931078600

002 PN-AAH-116

RICE DRYING RATES

Robayo, J.F.; Pfost, H.B.
Kansas State University, Food and Feed Grain Institute.
1973, 40 p.

In Grain Storage, Processing, and Marketing, Research Report No. 4

Rice is ordinarily harvested at moisture contents above safe storage levels, so additional drying is usually necessary. Although a great many studies have developed formulas for computing grain drying rates, none has proven universally acceptable. This Master's Thesis is the result of research to develop first an empirical equation for drying a thin layer of rice, and second a mathematical model capable of determining the effects of many drying parameters on the drying results. After a brief introduction, the thesis begins with a review of the literature, concentrating specifically on rice-drying terminology and fundamental concepts of drying (thin layer and grain drying). Next, the experimental procedure is laid out. The equation used for thin layer drying was developed by T.L. Thompson in his mathematical model of corn drying. The same pattern was followed here, with the parameters changed and new ones fitted for rice. The drying process was considered to be divided into separate processes, including temperature equilibrium between the grain and air, moisture removal, and evaporative cooling of the air and grain. Four drying tests were made with temperatures from 100–130° F in order to obtain the different parameters. This is followed by a comparison of predicted and measured results. These are shown in graph and table form. A brief discussion of the drying results concludes the thesis. The major conclusion reached is that the temperature of the drying air is the principal factor in the rate of drying. Appended to the thesis is an 18-item bibliography (1936–72) of literature cited.

AID/csd-1588

003 PN-AAH-230

FARM MECHANIZATION, EMPLOYMENT, AND INCOME IN NEPAL: TRADITIONAL AND MECHANIZED FARMING IN BARA DISTRICT

Pudasaini, S.P.
International Rice Research Institute (IRRI).

In IRRI Research Paper Series, No. 38

Farm mechanization (and specifically tractorization) in the developed countries has occurred primarily as a response to high and rising wage rates. The recent spread of tractorization to countries with low wage rates such as India, Pakistan, and Nepal raises two sets of questions. First, what is the source of benefits that account for the private profitability where wage rates are not high? Are yields raised, does cropping intensity rise, or is the primary benefit the replacement of animals? Second, does the tractor lead to direct labor replacement or to a slow-down in the growth of labor demand available from other innovations? This paper attempts to answer these questions in the context of the Nepal Terai. A survey of traditional and mechanized farms in Bara district was con-

ducted to assess the impact of mechanization on cropping intensity, income, employment, and efficiency. Production function analysis was used to "control" all differences, at least in a statistical sense. The results of the study were as follows: Cropping intensity, yields, income, and employment were higher on mechanized than on traditional farms. The much greater use of cash inputs and higher education levels associated with mechanized farms, however, made it difficult to attribute yields and income effects solely to machinery. Tractors could not be clearly linked with any on-farm labor displacement and pumpsets were found to raise farm employment. Tractor ownership allowed large farms to achieve higher cropping intensity through speedy and timely operations. Increased cropping intensity appeared to put a premium on timeliness for large farms, but did not seem important for small units. Tractorization permitted the farmers to nearly eliminate bullocks. The highest levels of efficiency were achieved by pumpset-owning and tractor-hiring farms rather than large tractor-owning farms.

AID/DSAN-G-0083 931082600

004 **PN-AAH-231**

EVAPOTRANSPIRATION FROM RICE FIELDS

Tomar, V.S.; O'Toole, J.C.
International Rice Research Institute (IRRI).
1979, 17 p.

In IRRI Research Paper Series, No. 34

Evapotranspiration is a primary component of the energy exchange function determining the production potential of crop species and the distribution of natural vegetation. It is highly correlated with net productivity. Realistic evapotranspiration estimates are important to irrigation engineers, agronomists, and others involved in agricultural planning. Although abundant data have been accumulated on evapotranspiration in rice growing countries, and the sciences of soil physics, plant physiology, and micrometeorology are becoming increasingly exact and quantitative, misunderstanding and misconceptions still abound. The present paper, based on a review of available literature on evapotranspiration in the wetland rice crop in South and Southeast Asia, describes evapotranspiration as a complex process affected primarily by climatic conditions. The basic principles affecting transpiration, evapotranspiration, and the ratio of actual evapotranspiration to open pan evaporation (ET–EP) in wetland rice culture are reviewed. Large differences in daily as well as seasonal total transpiration and evapotranspiration values exist for various locations in South and Southeast Asia. Crop transpiration rate is low at the early stage of growth and increases almost linearly, reaching 3–4 mm/day at maximum tiller number stage and 5–7 mm/day at heading time. Evapotranspiration also follows a similar trend for maximum rate. The seasonal average evapotranspiration in wetland rice fields is in the range of 4–7 mm/day. Evapotranspiration appears to vary with crop growth stage. The value of crop growth coefficient factor (ET–EP) is 1.0 at transplanting, reaching about 1.1 at maximum tiller number stage and about 1.2 or higher at flowering stage. A 1.15–1.2 ratio with open pan evaporation can be used to estimate ET for a crop season. From this review of physical and empirical information, a simple model is suggested to predict evapotranspiration from wetland rice. The authors caution the reader of the difficulty of interpreting the voluminous literature because of the interaction of varying seasonal climatic patterns, crop canopy development rates, and potential experimental and technical errors.

AID/DSAN-G-0083 931082600

005 **PN-AAH-233**

GENETIC ANALYSIS OF TRAITS RELATED TO GRAIN CHARACTERISTICS AND QUALITY IN TWO CROSSES OF RICE

Soomrith, B.; Chang, T.T.; Jackson, B.R.
International Rice Research Institute (IRRI).
1979, 16 p.

In IRRI Research Paper Series, No. 35

The development of semidwarf rices has markedly upgraded the yield potential of tropical rice. However, concurrent progress in incorporating traits related to fine grain quality into semidwarfs lags behind that for pest resistance and grain yield. This report discusses research aimed at determining the mode of inheritance and genotypic correlation on several characteristics of grain quality in crosses involving a semidwarf with the improved plant type as well as with two tall Thai varieties with good grain quality for the export market. Rice crosses IR648-3-1-2-3/GOW Ruang 88 and IR648-3-1-2-3/Khao Pahk Maw 148 were studied to determine the genetic components of five grain characteristics and plant type, and the genotypic relationship between the two groups of characteristics. Analysis of generation means indicated that the variation in 100-grain weight was largely due to additive gene effect. Both additive and dominance effects were major contributors to the variation in grain length and the ratio of grain length to width. Variations in chalkiness score and alkali digestion index in IR648/KPM148 were largely due to additive gene effect. In IR648/GR88, both additive and dominance effects were important. For amylose content, dominance effect appeared more important than additive gene effect. Estimates of inheritability for grain length, length-width ratio, alkali digestion index, chalkiness, and amylose content ranged from moderately high to high. In both crosses, grain length exhibited a significant association with the degree of slenderness, low degree of chalkiness, low gelatinization temperature, and high amylose content. The 100-grain weight was significantly and positively correlated with grain length, translucency, and amylose content. High amylose content was strongly correlated with low gelatinization temperature. The different types of gene effects controlling selected traits and the independence between the yield component characters and grain characteristics found in this study provide directions in formulating useful, effective, selection procedures for specific traits or the combination of desired traits in a breeding program. A list of 25 references (1952–73) is appended.

AID/DSAN-G-0083 931082600

006 PN-AAH-234

DETERMINING SUPERIOR CROPPING PATTERNS FOR SMALL FARMS IN A DRYLAND RICE ENVIRONMENT; TEST OF A METHODOLOGY

Garrity, D.P.; Harwood, R.R.; Zandstra, H.G.; Price, E.C.
International Rice Research Institute (IRRI).
1979, 13 p.

In IRRI Research Paper Series, No. 33

Strategies for increasing farm productivity that focus on introducing technical changes within a single-crop enterprise are often rejected by farmers because of unforeseen negative effects on productivity or resource utilization. Cropping systems research approaches the problem of fitting relevant technology into the small farm operation by determining the effects of potential technical changes on the entire system. This paper discusses the methodology for cropping systems research for dryland rice-based systems in the Philippines. Test patterns are grown on a portion of each cooperating farm under joint farmer-research team management. This methodology involves the farmer as an active participant in research activities. The farmer's participation in pattern testing facilitates early detection of some of the constraints to adoption at the farm level. The potential for increased crop productivity was tested in the Batanga region where the predominant cropping pattern involves dryland rice followed by field corn. In this program, alternative cropping was tested, including: following rice with alternative field crops that may offer advantages over corn; following rice with two crops to extend cropping further into the dry season; and following rice with intercrop patterns to replace monoculture corn. Alternative crops included soybean, peanut, mung bean, and cowpea. After 3 years of testing, it was found that adoption of an improved corn variety could increase productivity in the dryland rice–corn system studied. Soybean and sorghum appeared to be outstanding alternative crops. However, because neither is presently grown in the area, their adoption would represent a substantial change in the system. New infrastructural support, markets, and threshers would be required. Intercropping of corn shows the potential of substantially raising land productivity, but lack of labor appears to be a potential constraint. Cropping patterns with three crops per year were shown to be feasible and profitable. Thus, this field-testing program showed many ways to increase land productivity for dryland rice farmers. This paper has an attached bibliography of 11 references (1972–76).

AID/DSAN-G-0083 931082600

Workers transplant high-yielding varieties of rice in Bangladesh.

007 **PN-AAH-235**

AN ANALYSIS OF THE LABOR-INTENSIVE CONTINUOUS RICE PRODUCTION SYSTEM AT IRRI

Morooka, Y.; Herdt, R.W.; Haws, L.D.
International Rice Research Institute (IRRI).
1979, 43 p.

In IRRI Research Paper Series, No. 29

In September 1976, the Department of Rice Production Training and Research at the International Rice Research Institute (IRRI) began a one-year study of the agronomic and economic feasibility of a labor-intensive continuous rice production system (rice garden system). This paper compares the IRRI system with conventional production systems used in the Philippines. The comparison is carried out in terms of production, land use, labor distribution, water requirement, and the economics of the system (costs and returns to labor and capital, forms and amounts of capital used, and the cost of irrigation needed for highly intensive, small scale, production systems). A 1-hectare field was divided into 40 plots of 250 square meters each and these were transplanted every other day. Alternate plots were harvested on alternate days, 6 days a week. Gains resulted from this turnaround so that four crops per year were grown. During 1977, about 23 turnarounds per hectare (t/ha) were harvested and three men were fully employed with a relatively constant cash income flow, as compared with partial employment for one man and 10 t/ha from the double-crop rice system currently in use in the Philippines. The rice garden system thus provides dramatic opportunities to increase labor earnings, family income, and productivity of small rice farms. Specifically, the rice garden system efficiently uses about twice as much labor, uses land throughout the year, and produces three times that of the conventional two-crop rice production systems. The system also allows farmers to minimize damage caused by typhoon or pest epidemics because the stage of growth is different for each plot. Disadvantages are also cited. These are: (1) the possibility of a greater stress on the plants causing possible breakdown of disease resistance; (2) farmers without irrigation facilities could not use the system year round; and (3) the small plot size leads to labor intensity. A list of 13 references (1961–77) is appended.

AID/DSAN-G-0083 931082600

008 **PN-AAH-236**

ALIWALAS TO RICE GARDEN: A CASE STUDY OF THE INTENSIFICATION OF RICE FARMING IN CAMARINES SUR, PHILIPPINES

Morooka, Y.; Masicat, P.; Cordova, V.; Herdt, R.W.
International Rice Research Institute (IRRI).
1979, 25 p.

In IRRI Research Paper Series, No. 36

The continuous rice production system, or rice garden, was developed by The International Rice Research Institute (IRRI) as a method of intensifying rice farming. This report examines how one farmer in the Philippines developed this system, including the settling of difficulties involved in adopting and managing the system. This farmer is contrasted with two neighboring farmers using less intensive systems. There is a private gravity irrigation system available to all farmers which provides a year round water supply. Of the three farmers studied, two of them used staggered planting systems while one used simultaneous planting in which the whole paddy area is planted at once. Farmer A was the only one using the continuous rice production system, which includes staggered planting. Farmer B's application of current inputs was lower than the total inputs of Farmer A. Almost all tasks were performed with hired labor under traditional arrangements. Farmer C cultivated his farm with simple equipment, but used current inputs at a higher level than the total inputs of Farmer B. Farmer A had much higher rice yields, but he also had a higher degree of farm management problems. The most severe of these was the seasonality of labor use on his farm. Competition for hired labor frequently occurred among farmers because all labor-intensive practices occurred at the same time. To maintain an appropriate number of hired laborers for transplanting and harvesting, Farmer A made an arrangement whereby transplanters received the right to participate in harvesting and threshing, and to receive a one-eighth share of the harvest. In addition, Farmer A paid cash to workers for transplanting. The other two farmers used the traditional system of giving laborers a portion of the harvest. Farmer A used a larger amount of fertilizer than the others and this increased his yield. He also used specific pesticides for specific diseases, whereas the other farmers used the same pesticides for all diseases. This seemed to increase the health and yield of Farmer A's crop. Farmer A's greater use of farm machinery decreased hand labor and increased crop yield. A list of five references (1977–79) is appended.

AID/DSAN-G-0083 931082600

009 **PN-AAH-237**

CHANGES IN RICE HARVESTING SYSTEMS IN CENTRAL LUZON AND LAGUNA

Kikuchi, M.; Cordova, V.G.; Marciano, E.B.; Hayami, Y.
International Rice Research Institute (IRRI).
1979, 26 p.

In IRRI Research Paper Series, No. 31

Dramatic changes in rice harvesting and threshing arrangements are occurring in the Philippines in response to growing population pressures, land reform, improvements in irrigation systems, and the introduction of modern rice varieties. Using data collected from 100 farms, this study discusses the geographic and historical changes in harvesting and threshing arrangements in Central Luzon and Laguna, one of the country's major rice-producing areas. Harvesting and threshing represent major employment opportunities for landless workers and for small farmers whose incomes from farming are insufficient to meet their subsistence needs. After the harvest, production costs are deducted from the output, and the residual is divided between the landlord and the tenant, with harvest workers also receiving a significant share because harvesting and threshing costs are usually the largest items among production costs. In the Philippines, the crop is usually cut by hand, but threshing methods vary from hand beating

to large mechanical threshers. The more mechanized the operation, the smaller the laborers' share of the harvesting cost. Interacting with the choice of threshing technology are several contractual arrangements. The choice of technology and contractual arrangement depends partly on relative prices of capital and labor and technical conditions; and partly on risk, such as that of insufficient labor at peak periods. Social and institutional environments also weigh heavily on the harvesting and threshing technology. The landlord-tenant relationship is an especially critical factor. In the Central Region, this relationship is a paternalistic one, to the benefit of both parties. Here, modern technology has taken a foothold, and although most of the harvesting is still performed by hand beating, small machines are used extensively for threshing. In the Central Luzon, where large haciendas and large threshing machines were formerly the rule, haciendas have been broken up into smaller farms. Since this has occurred, large threshing machines are being replaced by either hand threshing or small threshing machines. For harvesting, hand beating is the rule. Appended is a list of 15 scientific references (1920–78).

AID/DSAN-G-0083 931082600

010 **PN-AAH-423**

SOME DIMENSIONS OF TRADITIONAL FARMING IN SEMI-ARID TROPICAL INDIA

Jodha, N.S.
International Crops Research Institute for the Semi-Arid Tropics (ICRISAT).
1979, 31 p.

In Economics Program, Progress Report No. 4

To better understand the constraints and potentials of traditional farming systems and to use this understanding to develop new technology for semiarid agriculture, this paper examines the rationality behind some of the traditional farming practices. It is based on studies conducted from 1975 to 1978 by the International Crops Research Institute for the Semi-Arid Tropics of 30 small, medium, and large farms in six villages in three agroclimatic zones of peninsular India. Results of direct relevance to generating new technology for semiarid tropical areas include the following: In the deep Vertisol areas, the practice of fallowing land during the rainy season and planting after the rainy season is important for small farmers. In the largely rainfed areas, the traditional practice of intercropping covers 35–73% of gross cropped area, while the extent of intercropping declines with increases in irrigation, practiced mainly on larger farms. As revealed by the number of crop mixtures (as high as 84 in a single village), traditional intercropping is highly complex, partly due to farmers' informal experimentation with crops able to satisfy production and environmental requirements. Hence, generation of low-cost technology for intercropping may help the less prosperous farmer. In turn, it appears that egalitarian objectives can be achieved through resources allocated to intercropping technology rather than through institutional means. While developing new intercropping technology, the many objectives of the farmer, such as profitability, employment, and subsistence, should be taken into account. Among other requirements for integrated watershed-based technology, large land areas are needed. However, land ownership and usage patterns of traditional farming systems pose institutional constraints. Due to the lack of individually owned land parcels large enough to constitute a composite miniwatershed, no alternative to group action exists which can ensure management of land for higher productivity and conservation on a watershed basis. To induce such group action, however, watershed technology must become highly profitable. For further reference, 21 entries (1963–79) are provided.

AID/ta-G-1421 931097200

011 **PN-AAH-424**

INTERCROPPING IN TRADITIONAL FARMING SYSTEMS

Jodha, N.S.
International Crops Research Institute for the Semi-Arid Tropics (ICRISAT).
1979, 22 p.

In Economics Program, Progress Report No. 3

Intercropping is a widely practiced farming system in many developing countries. Perhaps because of the complexity of intercropping, little research has been devoted to the subject, stifling the development and spreading of new agricultural technology for intercropping systems. This paper discusses only a few dimensions of intercropping as practiced in six semiarid tropical villages in India. Based on plotwise details of cropping patterns of sample farmers during three agricultural years (1975–78), it highlights two important features, having significant research and policy implications, of traditional intercropping systems. First, intercropping is more important on small, rainfed farms than on large, irrigated farms. Thus, any breakthrough in intercropping technology will be of most use to the poor, small farmer. Secondly, the traditional intercropping system is highly complex and diversified as indicated by a multiplicity of combinations in crop mixtures, as well as by its manifestation through a variety of other factors. From village to village, mixtures involving two crops were popular but those involving five to eight crops were not uncommon. Viewed from their share in gross cropped area, the most important mixtures were different in different villages. Farmers must satisfy both profit and subsistence requirements which can be served simultaneously by raising high-value cash crops like cotton and groundnuts and subsistence crops like sorghum and pigeonpea. The drought resistance of crops and their suitability for maintaining soil fertility, fodder requirements of farm animals, and the various soil contents constitute other factors affecting farmer decisions on specific crop mixtures. The author argues that the development of complicated intercropping systems is unnecessary. The best strategy lies in evolving a few simple intercropping systems which can satisfy such key objectives as profitability and stability, while keeping in mind labor use and soil fertility. These new systems should incorporate new agrobiological components, such as high-yield varieties, as well as new knowledge about land and water management. Ten bibliographic entries (1949–78) are included for further reference.

AID/ta-G-1421 931097200

012 **PN-AAH-497**

PROCEEDINGS OF THE INTERNATIONAL CONFERENCE ON THE UTILIZATION OF GUAYULE, TUCSON, ARIZONA, 1975

McGinnies, W.G.; Haase, E.F.
University of Arizona.
1975, 180 p.

Guayule is a shrub resembling sagebrush which grows wild in North-Central Mexico and nearby areas of the Big Bend region of Southwest Texas. It is a source of rubber and resin. To fill the demand for rubber during World War II, full-scale production and harvest of guayule resulted in the extraction of three million pounds of its rubber. In 1946, 21 million pounds of rubber were destroyed unharvested, and production of guayule abandoned for as yet unexplained political reasons. This report contains the proceedings of the International Conference on the Utilization of Guayule, held to apply knowledge gained from past guayule experimentation to some of the critical economic issues facing the United States and the developing world, and to assist decisionmakers in determining the merits of guayule as a source of domestic rubber. Technical subjects presented include pre- and post-World War II guayule production; the Emergency Rubber Project; seed treatment and nurseries practices of 1942; field production and harvesting; propagation from cuttings; experimental plantings in Israel; activities of the Continental Mexican Rubber Company; guayule diseases; rubber extracting and processing; guayule rubber utilization; deresination of guayule rubber; rubber production activities in Mexico; physiology and chemistry of guayule; soil-plant relationships; climatic relationships in the growth and production of guayule; California, New Mexico, Texas, and Arizona indicator plots; genetics and plant breeding; genetic and agronomic research; market potential and economic production; and retting. It was found that guayule production is readily mechanized; its moisture and fertilizer requirements are relatively low; guayule is physiologically ideal for genetic improvement; it is susceptible to common controllable diseases found in many conventional crops; and that its by-products — wax, wood pulp, and resin — may become important. A list of conference participants concludes the report.

AID/ta-G-1111 931015900

013 **PN-AAH-511**

NEW LANDS PRODUCTIVITY IN EGYPT: TECHNICAL AND ECONOMIC FEASIBILITY

Hesser, L.F.; Asmon, I.; Hedlund; F.F.; Gotsch, C.; Kean, J.; Leatham, W.; Parker, C.; Sparrow, G.B.; Stelly, R.; Sukkary, S.
Pacific Consultants.
1980, 214 p.

In Working Papers: PN-AAH-527, 288 p.

The Government of Egypt (GOE) has made heavy investments in land reclamation over the past 25 years and maintains a strong commitment to land reclamation. This study examines the technical and economic feasibility of land reclamation activities currently being considered by the GOE. It was found that the soil, water, and climate of many desert areas in Egypt are such that agriculture is technically feasible if adequate management and support services exist. The investment opportunities for individual farm units are generally positive in that high returns on investments, which are federally subsidized, are possible. The main economic difficulty in reclaiming new lands is the rising cost of energy. Where water must be lifted more than 20 meters, costs as compared with benefits do not appear economically feasible. Sprinkler irrigation projects do not appear feasible for the same reason. On the whole, large-scale reclamation of new lands can take place only at the expense of foregone alternative investments. On the other hand, rehabilitation of selected low-lying lands already reclaimed has a good potential for being both technologically and economically feasible. Nonetheless, a number of land reclamation opportunities with potentially attractive rates of return do exist. Criteria for such potential projects are as follows: (1) highest priority should be given to rehabilitating already reclaimed lands in areas where the required water lift is low; (2) public sector investments in reclamation of new lands should be oriented to reclamation projects in low-lying lands or projects involving water lift of only a few meters; (3) energy-saving irrigation methods should be used both in reclamation and rehabilitation projects; and (4) joint ventures to test for higher yields should be encouraged, as should reclamation through homesteading. Priority topics should include: improved agronomics, low-energy irrigation methods, rehabilitation of low-lying, badly drained, resalinized soils, and alternative means of organization for the operation and maintenance of irrigation systems. A bibliography (21 items, 1972–79) and annexes are included.

AID/ne-C-1645 263004200

014 **PN-AAH-527**

NEW LANDS PRODUCTIVITY IN EGYPT: TECHNICAL AND ECONOMIC FEASIBILITY WORKING PAPERS

Pacific Consultants.
1980, 288 p.

In Working Papers 1-10, Main Report: PN-AAH-511, 214 p.

Land reclamation has recently captured the interest of government officials in Egypt. Most new lands reclamation is being accomplished in desert regions. This report contains nine working papers which relate detailed backgrounds and descriptions of previously performed feasibility studies. Topics which are included in these working papers are: (1) crop budgets and farm plans; (2) sociological considerations, Tahaddi: a case study; (3) credit and input supply system; (4) marketing system; (5) prices; (6) perspectives for fresh produce exports; (7) agricultural research; (8) comparison of benefits of different agricultural projects; and (9) making technology the variable. Working paper one details the types of crops currently grown in the new lands, the effect of crop rotation, crop yields, the cropping pattern, and the methodology used on graduate farms. The second working paper discusses the meaning of the term, land reclamation, as it applies to different peoples in Egypt who live on these reclaimed lands. Tahaddi is the site of this case study and the working paper includes discussion of the research methodology and results of

the research. Working paper three concerns farming cooperatives in the Tahaddi area. Working paper four discusses market prices and quotas, consumer cooperatives, producer organizations for marketing, and training marketing personnel. Price policies are the main subject of the fifth working paper. Working paper six discusses seasonality of exports, tariffs, trade, and competition. The seventh working paper presents conclusions and recommendations on subjects relevant to Tahaddi as well as descriptions of agricultural research institutions in Egypt. These include: the Agricultural Research Center, the Soils and Water Research Institute, the Desert Institute, the South Tahrir Company, the American University in Cairo, and the Academy of Science. Working paper eight discusses returns on agricultural investments in the new lands and agricultural improvements in the old lands. The ninth working paper discusses irrigation technology in Tahaddi. A 21-item bibliography (1976–79) and a comparison of benefits of agricultural products is appended.

AID/ne-C-1645 263004200

015 **PN-AAH-565**

SUBJECTIVE PRODUCTION FUNCTION PARAMETERS AND RISK: WHEAT PRODUCTION IN TUNISIA

Roe, T.; Nygaard, D.
University of Minnesota, Department of Agricultural and Applied Economics.
1979, 14 p.

In Staff Paper, pp. 79-43

The problems of resource allocation by farmers become acute when the parameters of the underlying technology are not known with certainty. The problems become even more acute if these parameters vary in some complex manner, as in the case of wheat, with yearly weather, soil moisture, disease, and other soil and atmospheric conditions affecting plant growth. This paper explores these probems, by focusing on 125 farmers in Northern Tunisia during the 1976-77 crop year. The farmers' holdings ranged in size from 2 to 381 hectares (ha), with an average of 27 ha planted in durum wheat. The authors maintain that Tunisian farmers form subjective estimates of the parameters of the underlying production function. To substantiate this thesis, each farmer was interviewed twice during the crop year. The first interviews were conducted at the time of seedbed preparation, with the farmers providing estimates of their yield at harvest (given the current available level of inputs and assuming that normal weather conditions would prevail during the growing season). Each farmer was interviewed again at harvest. The results suggest that the farmers overestimated their yields, but that the cause of this overestimation was unusually low rainfall. Otherwise, the farmers appeared to correctly perceive the true parameters of their total possible output. In addition, the farmers were generally found to be risk adverse (in terms of allocating resources and adopting new high-yielding varieties), when the source of the uncertainty was weather and/or prices. The authors note that the mathematical method used in this study is unique and appears to be a reasonable approach to measuring and identifying the cause of allocative error, risk, and the value of providing this information to farmers. Previous researchers have relied on cost minimization or profit maximization frameworks to determine the effects of risk and uncertainty on resource allocation and the use of technology. The conceptual framework employed in this study takes into consideration both of these elements. A brief bibliography (13 English titles and 1 French title, 1966–77) is included in the report.

AID/ta-BMA-5 931023600

016 **PN-AAH-566**

INSTITUTIONAL FACTORS AFFECTING THE ADOPTION OF AGRICULTURAL SECTOR ANALYSIS METHODOLOGY IN LDC'S

Klein, H.; Roe, T.
University of Minnesota, Department of Agricultural and Applied Economics.
1978, 20 p.

In Staff Paper, P78-10

Despite recent efforts to develop and apply agricultural sector analysis (ASA) models in LDCs, data on the institutionalization of ASA techniques within policymaking sectors remain lacking. This document discusses the issues and constraints regarding such institutionalization, as exemplified in the ASA model developed in Tunisia. After a brief outline of the Tunisian model itself and a brief review of the literature on the use of ASA methods in general, the question of institutionalization of ASA methods in Tunisia is explained. Several general insights can be drawn from the Tunisian experience. First, the models that are used must be understood by the operating host officials and fall within their authority. This was not entirely the case in Tunisia. In addition, further decomposition of the ASA model would have yielded more utility. Also, data should be collected through government channels so that any updating of the model will not be constrained by the need to allocate sources to obtain the new data. The analytical model should be built upon a progression from field work up to model coefficients. This is important for training and provides for consistency checks. The model and selection of techniques should not be beyond the capabilities of the implementing agents. The specification of time, space, and form dimension variables should be related to the instruments and variables used by the host implementing agency. Dialog between builders and planners during the preliminary stages can provide knowledge so that institutional constraints and informational channels can be dealt with more efficiently. If ASA techniques cannot be applied to traditional structures, they must be closely linked with the decisionmaking authorities. Finally, institutionalization problems appear to be related to the resources, structure, and behavior of host country institutions. The paper concludes by suggesting that these factors should be kept in mind by ASA analysts if ASA methods are to exert an important influence on policymaking. A bibliography includes 14 English titles (1972–76).

AID/ta-BMA-5 931023600

017 **PN-AAH-568**

GUAYULE: A RUBBER-PRODUCING SHRUB FOR ARID AND SEMIARID REGIONS

McGinnies, W.G.; Haase, E.F.
University of Arizona, Office of Arid Lands Studies.
1975, 273 p.

In Arid Lands Resource Information Paper No. 7

Guayule, the only species of the genus *Parthenium* known to produce significant amounts of rubber, is a shrub native to the dry lands of north central Mexico and the adjacent Big Bend area of Texas, usually growing at an altitude between 2,000 and 6,000 feet. It is largely restricted to outwash slopes of calcareous soils in regions having an annual rainfall of 10–15 inches, that occurs principally in late spring and early autumn. Although guayule is grown commercially in the U.S., extensive scientific research has provided the necessary methods for its successful culture and for rubber production elsewhere. This historical review of the cultivation of guayule in the U.S. was produced in order to aid in the eventual establishment of guayule as a thriving commercial enterprise among Southwestern Indians and other peoples in arid and semiarid zones. In 1930, an investigation undertaken by the War Department underscored the interest of the U.S. government in encouraging the domestic guayule industry in order to reduce dependency upon foreign markets, provide a certain national source of rubber in a grave emergency, and employ thousands of American farmers and laborers. In response to the investigation, federal legislation providing for the planting of guayule was passed. This legislation and the subsequent research and operational investigations undertaken to optimize production are described. Detailed attention is given to guayule agronomy, including its ecology, seed and seed handling, nurseries, field practices, insect and disease control, harvesting, and methods of extracting rubber. Attached to the historical review is a bibliography prepared primarily for participants in the International Conference on the Utilization of Guayule, held to explore the state of knowledge and available information on the guayule rubber plant from pre-World War II days through recent developments and to deliberate on the immediate and future economic potential of guayule. The bibliography contains more than 900 entries (1900–73), for which 225 brief annotations were prepared. A number of unpublished, but available, documents have been included to provide as complete a bibliography as possible.

AID/ta-G-1111 931015900

018 **PN-AAG-845**

RECOMMENDED SUPPORT FOR GRAIN POLICY DEVELOPMENT AND IMPLEMENTATION IN SRI LANKA

Borsdorf, R.; Anderson, D.; Anderson, D.
Kansas State University.
1979, 136 p.

What are the problems currently hampering the development and implementation of a rational grain policy in Sri Lanka? The present study attempts to answer these questions in view of potential USAID support. This study is divided into three sections. The initial section focuses upon basic needs in marketing policy development. Current policy is tilted towards political rather than economic rationalization with mixed results. On the one hand, the proliferation of government marketing agencies has caused a duplication of marketing functions and a lack of policy coordination. On the other, pricing policies aimed at increasing paddy production have been successful, but the impact is uncertain, leaving future policy without a clear direction. Major needs are in data collection and analysis (including the institutionalization of this capability) and coordination of data analysis with policy decisionmaking. Problems and needs of the Paddy Marketing Board (PMB) are discussed next. The PMB's role is not clearly defined; its activities are uncoordinated with the other agencies having paddy and rice marketing responsibilities; and its organizational structure is deficient in upper management personnel. While recent pricing policies directed by the PMB have been sound, its staff suffers from a serious lack of data collection/analysis and management skills. The PMB must refine its pricing system, direct more attention to reserve stocks, and clarify its objectives. A third and final section discusses the dryland farming sector. While production resources sufficient to greatly expand dryland farming do exist, little is known about the marketing institution's capability for handling increased production. Also, little is known about the comparative production advantages of Sri Lanka's crops or their marketing potential. A study of cropping and marketing options must be made and the procurement and sale of dryland crops must be clarified. Also, consideration should be given to a modest price rise in coarse grains and the expanded production of fingermillet and sesame. Included in each of the above sections are specific recommendations for donor support. A 33-item bibliography (1969–79) is also included.

AID/ta-C-1162 GTS 931078600

019 **PN-AAH-063**

POTENTIALS AND PITFALLS OF PRODUCT MARKETING THROUGH SMALL FARMER GROUPS

Fox, R.
1978, 21 p.

In December 1978, a Central Treaty Organization (CENTO) seminar was held in Lahore, Pakistan, on increasing the productive capacity of small farmers. This report was prepared for and presented at this seminar. The author discusses programs to improve the general marketing system as well as marketing through small farmer groups. Food products, agricultural inputs, and rural consumer goods are three markets identified as relevant to small-scale producers. These programs involve changes in market infrastructure, economic policy, and legal measures, such as the construction of roads, the establishment of credit programs, and a uniform system of grades, weights, and measures. Improvements in the general marketing system are then applied to product marketing through small farmer groups. Improved processing and marketing through vertical integration, economies of scale, and increased bargaining power of small farmers vis-a-vis middlemen and processors are three economic arguments presented in sup-

port of product marketing through group action. However, the report also describes difficulties in forming effective product marketing groups, such as the small farmers' lack of capital and organizational resources. Furthermore, government intervention through farm-level price-fixing, as well as outside competition in traditional marketing systems, limits the small farmers' gains. An examination of these problems led the author to conclude that the potential of product marketing through small farmer groups is limited. The report concludes with recommendations for establishing effective marketing programs through group action. For example, economic success requires that local production and marketing systems be considered in the design of group action programs. In addition, group action programs must be technically feasible, distribute benefits equitably, and be accompanied by complementary improvements in the general marketing system. Included in the report is an appendix of supply and demand graphs to illustrate the effects of improved product marketing on food prices.

AID/ne-C-1578 290020000

020 **PN-AAH-241**

FORMULATION OF LINKAGES IN RURAL REGIONS FOR PURPOSES OF REGIONAL DEVELOPMENT RESEARCH

Applegate, M.J.; Badger, D.D.
Oklahoma State University.
1979, 98 p.

Techniques or tools to measure impacts of government programs and projects on the lowest income groups in the LDCs are urgently needed. An A.I.D. research project, for which this document is a final report, addressed that need by attempting to identify linkages among the rural poor, urban poor, and other sectors of the economy by means of a low-cost methodology study. Understanding these linkages, which are defined as market transactions or flows of goods and services among population segments, economic sectors, and regional locations, is a prerequisite to any reliable project analysis. The research project was specifically designed to analyze the linkages of two rural LDC regions and to test hypotheses pertaining to agricultural and regional development emanating from differences in the extent and form of linkages. Nicaragua was selected for study on the basis of a number of considerations spelled out in the introduction to this report. The methodology is discussed in the following section. Next, the regions selected for analysis are described in terms of topography and climate, vegetation and soils, agricultural and livestock activities, land use, highway and road network, and population characteristics. Following this, the results and interpretation of data are presented. Among the important differences noted by the authors in the nature of linkages was that both consumers and producers in the region where traditional agriculture is most common are apt to depend upon counterparts in the local community in which they reside, whereas those in regions characterized by a more sophisticated agricultural technology tend to rely on purchases in the regional center and outside the region. The authors concluded that government programs such as construction of infrastructure will have a relatively greater positive indirect impact on rural development and on reducing poverty if carried out in areas in which the linkages to a large regional center or to outside the region are not well-developed. A list of six Spanish and English language references cited, two questionnaires used, and the input-output matrix are appended.

AID/ta-C-1427 931115700

021 **PN-AAG-789**

UTILIZATION OF PHOSPHATE ROCK IN TROPICAL SOILS OF LATIN AMERICA

Fenster, W.E.; Leon, L.A.
International Fertilizer Development Center (IFDC); Centro Internacional de Agricultura Tropical (CIAT).
1978, 49 p.

The high cost of fertilizers, especially those containing high amounts of phosphorus (P), is one of the main limiting factors in increasing crop production in tropical Latin America. The direct use of phosphate rock (PR) or of some of its low-input altered products would seem to present a logical approach to overcoming this constraint. This paper selectively reviews the literature on soils and phosphorus fertilizer problems in tropical Latin America, identifies objectives for further research, and outlines a research program to meet those objectives. After a brief introduction, the literature review is presented. The review is divided into the following categories: (1) general P and soils review; (2) direct application of PR to soils; (3) characterizing phosphate rocks; (4) greenhouse and field investigations with PR; (5) greenhouse and field investigations with partially acidulated PR; and (6) greenhouse and field investigations with thermally altered PR. Next, the objectives of the research proposal are spelled out. First, an evaluation of the effectiveness of sources and methods of application of P fertilizers on soils of tropical Latin America is needed. Second, the research should determine the forms and availability of the reaction products of these fertilizers in soils as related to their initial and residual effectiveness. Finally, criteria need to be established for applying the results of the first two objectives to different soils and crops at various locations by conducting field experiments on selected soils throughout tropical Latin America. It is proposed that these objectives be accomplished through interrelated and pertinent laboratory, incubation, greenhouse, and field experiments. Currently, it is planned that the research will be carried out in Colombia, Brazil, Peru, Ecuador and other countries as may be appropriate over a 7–10 year period. The final part of the paper presents the reasoning and justification for the proposed research. Various charts and graphs and a 51-item bibliography (1943–77) of English, Spanish, and Portuguese language references are also included.

AID/ta-G-1218 931005400

022 PN-AAG-790

MANAGEMENT OF PHOSPHORUS FERTILIZERS IN ESTABLISHING AND MAINTAINING IMPROVED PASTURES ON ACID, INFERTILE SOILS OF TROPICAL LATIN AMERICA

Fenster, W.E.; Leon, L.A.
International Fertilizer Development Center, (IFDC); Centro Internacional de Agricultura Tropical (CIAT).
1978, 49 p.

The Oxisols and Ultisols (soil types) of tropical Latin America have a high phosphorus fixation, so that substantial amounts of phosphorus must be added to satisfy the requirements of the soils and of the plant species which grow in them. The extremely low levels of both total and available phosphorus therefore create a major problem in establishing and maintaining improved pastures on these soils. Because of these constraints, along with the high unit cost of phosphorus fertilizers, alternative methods of managing improved pastures must be considered. This paper considers four economical methods of improving forage production while still satisfying the phosphorus requirements of the plant. These are: (1) selection of plant species that will tolerate relatively low levels of available soil phosphorus; (2) determining rates and placement of phosphorus fertilizers to increase their efficiency, both initially and residually; (3) use of cheaper and less soluble forms of phosphorus carriers; and (4) use of soil amendments to enhance the availability of soil-applied phosphorus. After discussing each of these methods, the authors conclude that long-term, comparative studies need to be conducted with the various phosphate rocks and their low-cost altered products to ascertain if it is feasible to use them in deference to the more soluble but costly phosphorus carriers. Further research is also recommended to determine the effect of added amendments on the availability of applied phosphorus. When these problems have been researched, it should then be possible to make relatively accurate phosphorus fertilizer recommendations for any given pasture management scheme. This will only be accomplished when both plant and soil phosphorus needs are better understood. A list of 11 references (1964–78) in English and Spanish is appended.

AID/ta-G-1218 GTS 931005400

023 PN-AAG-791

THE BANGLADESH FERTILIZER SECTOR

Chuang, Y.H.; Hill, J.M.; Barnett, B.H.
International Fertilizer Development Center (IFDC).
1978, 57 p.

In Technical Bulletin IFDC-T-11

Despite a significant increase since its inception in 1952, current fertilizer use in Bangladesh is far below the recommended rate; and local production and distribution are inadequate to meet domestic needs. This report analyzes current and potential problems of Bangladesh's fertilizer sector and recommends projects and studies to solve them. To meet the challenge of the projected rapid increase in fertilizer use and reduce the burden of government and donor subsidies, the system's capabilities must be better utilized through improved planning, organization, coordination, monitoring, communication, and information development and exchange. Agricultural research and extension are fragmented, resulting in duplicated efforts and inadequate financial, manpower, and facility resources. Besides geographic and climatic factors, fertilizer supply and use are affected by: (1) shortage and irregular availability of fertilizer; (2) lack of coordination on all levels; (3) low incentives for farmer usage; (4) poor communication systems; and (5) shortage or export of skilled extension, technical, and management personnel. Also, as fertilizer use increases, there will be additional needs for port, transportation, handling, storage, marketing, and communications facilities. Recommendations for solving current problems include conducting an organizational study of the entire fertilizer sector and of the Bangladesh Agricultural Development Corp.; developing 5-year supply and demand plans; implementing management training programs; and studying incentives for fertilizer wholesalers, retailers, and farmers. Recommendations for solving potential problems include indepth studies of: government subsidies; building rather than leasing future warehouses; fertilizer use; future P_2O_5 supply strategy; private sector fertilizer wholesaling, handling, and packaging; as well as development of a transportation and warehousing model, and standard fertilizer specifications. A demographic and geographic Bangladesh data list as well as a direct fertilizer subsidy worksheet are appended.

AID/ta-G-1218 GTS 931005400

024 PN-AAG-793

WORLD FERTILIZER SITUATION AND OUTLOOK, 1978-85

Harris, G.T.; Harre, E.A.
Tennessee Valley Authority (TVA), International Fertilizer Development Center (IFDC) and National Fertilizer Development Center (NFDC).
1979, 27 p.

In Technical Bulletin IFDC-T-13, Updated version of World Fertilizer Market Review and Outlook: PN-RAA-230

Recent increases in world food production are largely the result of increased use of fertilizer in the world's primary agricultural regions. The present report, a joint product of the International Fertilizer Development Center (IFDC) and the National Fertilizer Development Center of the Tennessee Valley Authority (TVA), updates a 1974 TVA report. It reviews the current world fertilizer situation and projects the 1978–85 world and regional supply/demand for major fertilizer nutrients. Three types of fertilizer — nitrogen, phosphate, and potash — are discussed in terms of world capacity, production, consumption, supply/demand balances, and regional supply/demand balances. The fertilizer industry is characterized by a cyclical pattern of long periods of oversupply and brief periods of shortages. The following projections were made for 1977–85: (1) world fertilizer production will increase from 98 million nutrient (nitrogen, phosphate, and potash) metric tons (m/mt) in 1977 to 141 m/mt in 1985, with anticipated production in developing countries of 25% by 1985 as opposed to 10% in 1969;

(2) fertilizer consumption will increase from 95 m/mt to over 135 m/mt, with an annual growth rate of 4.6% compared with 6.0% for 1969–77; (3) world ammonia capacity, already overbuilt, will increase by 31 m/mt between 1978 and 1985; (4) nitrogen fertilizer production will increase from 46 m/mt to 72 m/mt, while consumption will increase from 45 m/mt to almost 67 m/mt, with no supply shortage anticipated; (5) due to increases in livestock feeding costs, nitrogen production will shift from traditional producers to areas where low-cost natural gas is available; (6) phosphate fertilizer production will increase from 27 m/mt to 39 m/mt, with consumption expanding from 26 m/mt to 37 m/mt; and (7) potash fertilizer production will increase from 25 m/mt to 31 m/mt, while consumption will increase from 23 m/mt to 32 m/mt, leading to a possible shortage by 1985. The above projections are limited by the unavailability of reliable data from China and the U.S.S.R., two of the world's largest fertilizer producers and consumers. An overview of world fertilizer consumption, patterns of ownership, prices, and a 13-item bibliography (1974–78) are appended.

AID/ta-G-1218 GTS 931005400

025 **PN-AAH-228**

DENITRIFICATION LOSS OF FERTILIZER NITROGEN IN PADDY SOILS; ITS RECOGNITION AND IMPACT

Watanabe, I.; Mitsui, S.
International Rice Research Institute (IRRI).
1979, 12 p.
In IRRI Research Paper Series, No. 37

After a large nitrogen loss by denitrification in paddy soils was first recognized in Japan in 1941, field studies to minimize this loss were conducted both in Japan and in all rice-growing countries. This paper outlines the history of these studies and their principal results. The paper is divided in two parts. The first part presents an historical review of Shioiri's discovery of the loss of surface-applied nitrogen by denitrification in flooded rice soils and of the consequent Japanese efforts to minimize this loss through deep placement of nitrogen fertilizer. The historical succession of innovations to make deep placement practical and acceptable to farmers, such as deep placement of urea after transplanting or of nitrogen at panicle formation stage, are noted. Also noted are the forms and methods of mechanized deep placement, e.g., the use of nitrogen, liquid ammonia, and liquid fertilizers; and the uses of fertilizer applicators attached to engine-driven cultivators and of band applicators of paste fertilizers attached to an engine-driven transplanter. The second part of the report describes other international and national efforts in these areas, such as deep placement trials with ammonium sulfate, urea, and slow-release nitrogen fertilizers at the International Rice Research Institute; and the joint Food and Agriculture Organization/International Atomic Energy Agency effort to form an international network of fertilizer trials for wetland rice. Studies being undertaken in the tropics on ammonia volatilization loss in association with high pH of floodwater due to algal photosynthesis are summarized, and the implications of recent research for tropical rice farmers (who are still generally reluctant to adopt new methods of application) are discussed. A 30-item list of references (1935–79) is appended.

AID/DSAN-G-0083 931082600

026 **PN-AAG-818**

ESTIMATION OF CONSUMPTIVE USE OF WATER FOR WHEAT UNDER OPTIMUM MANAGEMENT CONDITIONS

Haidar, G.; Farooqi, M.A.; DeMooy, C.J.
Colorado State University.
1975, 37 p.

Conservation of existing irrigation supplies in Pakistan is becoming more and more important as the demand for irrigation water increases and new sources of supply become harder to find. One of the objectives of the Mona Reclamation Experimental Project is to develop new techniques for on-farm water management. This report is part of that program. Currently, much water is wasted by over-irrigation of crops. A large portion of this water could be saved by applying the exact amount of irrigation water required. Since wheat is one of the most important food crops in Pakistan, it was chosen for study. The test site consisted of a one-acrefield of medium-to-fine-textured, non-saline, non-alkali soil. Final moisture sampling was done at the time of the wheat harvest. The samples were dried in an electric oven at 105°C to constant weight, and the moisture contents were calculated on a dry-weight basis. The consumptive use of water was worked out by two independent methods. The first consisted of gravimetric measurement of soil moisture depletion, in which consumptive use was measured by adding the water loss between soil samplings — i.e., before and after each irrigation, plus pan evaporation for 3 days after each irrigation, plus rainfall, plus evapotranspiration for the days not otherwise accounted for. The second method measured the total quantity of irrigation water applied during the growth period, plus or minus the difference in soil moisture at sowing and harvest time. The study determined that an appreciable amount of water can be saved, without a loss in production, by using no more than 14 inches of water from irrigation, rainfall, and moisture available in the soil. More complete results, in terms of evapotranspiration, consumptive use, and wheat yield, are also discussed. The authors note that the study is still in progress, so that the findings should be used with caution. The report includes numerous charts and a brief bibliography (16 references, 1957–73).

AID/ta-C-1100 931048900

027 **PN-AAG-847**

IMPROVING IRRIGATION WATER MANAGEMENT ON FARMS: ANNUAL TECHNICAL REPORT, 1978/79

Colorado State University Engineering Research Center.
1979, 650 p.

The irrigation system of Pakistan represents one of the largest modern conveyance systems in the world and is a marvel of engineering skill and technology. There are, however, many problems concerning the farm-level portion of the system. This document reports on the progress of Colorado State University (CSU), contracted under an AID-funded project to assist the Pakistani farmer operate and manage the water from the canal outlet through the irrigated field. Among the most significant CSU accomplishments during this report year were: (1) continuation of

field studies, including the watercourse cleaning and maintenance research program; (2) completion of watercourse surveys, including physical and socioeconomic aspects; (3) implementation and evaluation, in conjunction with USAID and the Government of Pakistan (GOP), of the On-Farm Water Management Pilot Project; (4) conducting preliminary field studies and seminars regarding alternatives and the legal framework necessary for organizing farmers to improve on-farm water management practices; (5) preliminary development of training materials and training of Water Management Extension Officers for the pilot project; (6) development of related research proposals; (7) completion of a reconnaissance survey for identifying on-farm water management constraints; (8) successful development of various improved watercourse construction and control devices; (9) cooperative research with the major agricultural research centers in Pakistan pertaining to wheat, rice, cotton, and maize; and (10) development of three major manuals (on problem identification, development of solutions, and project implementation) for transferring the results of this project to other LDCs. As a result of the wide dissemination and utilization of research results, water management research activities have been institutionalized, and the need for improved water laws and codes and for strong incentives encouraging development of farmer organizations for watercourse improvement has been accented. Attached to the report are an annotated list of project publications and 32 appendices describing the results of research performed and evaluating the progress of selected project activities in detail.

AID/ta-C-1411 931048900

028 **PN-AAG-964**

NORTHEAST RAINFED AGRICULTURAL DEVELOPMENT PROJECT — AN OPPORTUNITY FRAMEWORK

University of Wisconsin.
1979, 97 p.

In Consulting Report No. 2

Exhaustion of the land frontier and the twin risks of crop failure due to weather and price failure due to fluctuating world markets require that new sources of income and productivity be found for farmers in the predominantly rainfed areas of Northeast Thailand. As part of a prefeasibility study for the Northeast Rainfed Agricultural Development Project, this report outlines major strategic and project intervention elements, together with key organizational issues, for development of the region. An initial chapter describes a simple model relating the roles of research, extension, institutional change, and the concept of area development for increasing rural income and productivity. Such increases are seen as depending upon: (1) technological innovations and product/income prices which raise the optimal production level and create a gap which may be filled by farmers; (2) the acquisition of skills and new practices, mainly through extension, to close the gap between what is optimal and what is actual; and (3) institutional changes which promote farmer access to new technology while removing or reducing the risks to its employment. Individual elements of a rainfed agricultural project for the area are discussed next, including systems for upland and paddy crops, water resource management, livestock, fisheries, land tenure, and marketing and processing of major agricultural products. Specific recommendations include improvement of paddy and crop production through the use of azolla as a technique of biological fixation and through the use of direct seeding of photoperiod insensitive varieties timed to flower at the time of optimal soil moisture, and development of appropriately fertilized groundnut as a soil building crop by upland farmers. Preproject activities are also discussed and those requiring immediate attention, such as site selection and the need for accelerated research and field testing of new production techniques, are pointed out. A final section proposes an organizational and administrative framework for ensuring effective project planning, programming, management, and execution. Appended are 20 references on individual points raised in the course of the report.

AID/DSAN-C-0060 493029200

029 **PN-AAH-225**

SOCIAL ANALYSIS OF POTABLE WATER PROGRAMS

Self, G.D.
1979, 78 p.

Few development projects have a greater potential for directly benefiting the rural poor than water supply improvement projects. The benefits which accrue from potable water projects include improved water quality, quantity, accessibility, and reliability. This paper considers the non-engineering aspects of such projects in an effort to improve site selection and design. Three major issues with regard to water projects are water quality and its proper emphasis, the role of education, and water facilities maintenance. Over the past few decades a wide array of diseases have been grouped together as waterborne or water-related diseases. This has unfortunately led to a misunderstanding of the relationship between water and many infectious diseases. For example, it was once doctrine that diarrhoeal disease was transmitted primarily through water sources. However, recent research has found little evidence to support this thesis. In fact, a number of studies have shown decreases of diarrhoeal disease with increases in water availability — without regard to quality. These studies have also recommended the inclusion of a community education component in all potable water projects. Due to poor hygiene, water that is perfectly safe at the tap is often polluted by the time of consumption. Finally, it is maintenance that often determines the success or failure of water projects. An estimated 35–50% of rural water projects are not functioning 3–5 years later. For the most part, developing countries have tended to emphasize construction, with little thought given to future maintenance or recurrent expenditures. This tendency has been buttressed by a similar lack of attention from international donors. Overall, the author recommends greater emphasis on social analysis (earlier in the project planning stage than is now customary) as well as increased community participation in terms of planning, assignment of financial responsibility (or in-kind services), and maintenance. Report includes an annotated bibliography (18 items, 1964–78), a brief

A safe, readily available water supply is a simple, but critical step in development.

report on A.I.D. experiences in water supply programs, and checklists for social and sector analyses of potable water projects.

AID/ne-C-147-79-5

030 PN-AAH-329

DRYLAND AGRICULTURE IN WINTER PRECIPITATION REGIONS OF THE WORLD: STATUS OF THE TECHNICAL ART

Oregon State University, Office of International Agriculture.
1979, 218 p.

Nearly 600 million hectares of the world's arable crop lands are considered semiarid to arid, receiving less than 500 mm of annual precipitation. Despite the lack of rainfall, these zones are major cereal crop producers as well as being home to approximately 450 million people. This document explores the problems and potentials of dryland agriculture, specifically in the winter precipitation regions of the world, which include Northern Africa, the middle latitude dry climates of Eurasia (Iraq, Syria, most of Asiatic Turkey, and the Iranian Plateau), and northwestern North America. Drylands, however, are not exclusively cereal producing regions, for farming in these regions generally includes livestock production. Thus, it becomes critically important to clarify the underlying physical and economic relationships between cereal and livestock production. For example, incidental forage production (crop residues and weeds) constitutes an important source of feed for livestock during periods when range forage is scarce. Furthermore, improved livestock production has a significant potential for employing laborers during the off-seasons. Trade-offs and conflicts between cereal and livestock production must also be considered — such as the fact that certain production techniques (i.e., clean fallowing) reduce forage for grazing. The authors recommend that future development efforts stress both the interrelationship between crop and livestock production and mitigation of weather-related risks of dryland farming. Perhaps the single most important aspect of dryland farming lies in this interrelationship of interfaced livestock and dryland agriculture. Other topics covered by the report include soil fertility, dryland farming equipment, rangeland resources, range animals, and grazing management. Bibliographies follow each section of the report, with most of the references dating from the mid-1960's through the 1970's. Numerous tables and charts depicting incomes, production levels, prices and average rainfall in the various dryland regions are provided.

AID/ta-G-1221 211(d) 931016200

031 PN-AAH-332

ASSESSMENT OF IRRIGATION ACTIVITIES IN BOLIVIA

Harvatin, J.R.
Devres, Inc.
1980, 53 p.

The use of irrigation in Bolivia is very inefficient. Although approximately two-thirds of the nation's population is engaged in agriculture, production remains at a low level. Traditional production methods, poor management, and lack of capital are primary obstacles to improved productivity. The author of this report made

onsite visits to irrigation projects throughout Bolivia, interviewing local farmers as well as project personnel. Irrigation has often had disastrous long-term effects in terms of crop yields and soil erosion. Impinging on the capability of many of these lands to sustain irrigation are such factors as steep slopes, soils susceptible to erosion, shallow soils, limited moisture-holding capacity, rocky soil, salinity, threat of waterlogging, frequent flooding, and adverse climate. Nevertheless, there are strong indications that, with the use of modern soil conservation technology, Bolivian agriculture could significantly benefit from irrigation. Steep slopes can be benched, terraced, and corrugated for close-growing crops, etc. However, land capability should be carefully considered in the future selection of irrigated projects. Data should be collected on streamflow, surficial storage, and underground waters. Realistic and meaningful cost/benefit studies should be prepared for all projects. Overall, there is a critical lack of trained personnel, tools, and equipment for current irrigation activities. The author recommends that a concentrated effort be made to intensify the Government of Bolivia's (GOB) education and extension services, focusing on basic farm management, production techniques, irrigative water management, and soil conservation. The frequent use of irrigation water contaminated with raw sewage poses a significant health hazard. The GOB should be encouraged to implement meaningful water laws. Current irrigation activities are being carried out by several different institutions. These institutions should be consolidated, and an effective irrigation authority established to provide national policy and administrative and technical direction.

AID/SOD/PDC-C-0223 511000001
Also available in Spanish: PN-AAH-333, 44 p.

032 **PN-AAH-422**

THE PROCESSES OF DESERTIFICATION AND THE CHOICE OF INTERVENTIONS

Jodha, N.S.
International Crops Research Institute for the Semi-Arid Tropics (ICRISAT).
1979, 18 p.

In Economics Program, Progress Report No. 2

The arid zone of Rajasthan currently accounts for nearly 63% of the tropical arid areas in India, and is expanding. This paper, published by the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), examines the process of desertification in that zone. This process includes the loss of top soils, submersion of fertile lands under shifting sand dunes, appearance of saline wastelands, drying of dug wells or increased salinity of well waters, replacement of superior perennial grasses by inferior species, reduced crop productivity, and the eventual outmigration of people and animals. This region's primary resource is grazing land, with only a few areas capable of sustained cropping. As a result, a system of mixed farming (crop and livestock production) has evolved and is increasing. However, this increase in mixed farming has led to the cultivation of lands suited only to natural grasses and to the overstocking of fast-shrinking grazing spaces. A lessening of the physical and market isolation of the region (primarily through road construction) has accelerated the adoption of mixed farming — with two major implications: First, while making possible immediate assistance to inhabitants during periods of drought, every intervention (however well-intentioned) has sowed the seeds for a further, more serious crisis by increasing pressure on the resource base without strengthening the base itself; secondly, increased access to markets has spurred farmers to continue over-cultivation of nearly exhausted lands. In addition, land reforms of the 1950's inadvertently contributed to the desertification of the region by abolishing feudal taxes and penalties for the use of some lands and by placing more areas under cultivation. Reversal of this resource-exploitation process should begin by neutralizing the factors listed above — both through the use of technology (stabilization of shifting sand dunes, reseeding, construction of ridges and contour trenching, creation of shelterbelts and microwind breaks, and instituting moisture-conservation measures) and the adoption of tax incentives and disincentives to encourage conservation. A bibliography of 25 entries is appended (1964–78).

AID/ta-G-1421 931097200

033 **PN-AAH-500**

THE IMPACT OF GROUNDWATER DEVELOPMENT IN ARID LANDS: A LITERATURE REVIEW AND ANNOTATED BIBLIOGRAPHY

Keith, S.J.
Arizona University, Office of Arid Lands Studies.
1977, 149 p.

In Arid Lands Resource Information Paper No. 10

As groundwater development is increasing, it is imperative to anticipate the cultural impacts of its development. This paper reviews the literature on the physical and socioeconomic effects of groundwater development in arid lands and presents a related annotated bibliography of 188 entries (1935–77). As a whole, this literature only scratches the surface of its topic. The author notes that most of it addresses only the negative physical impacts, and disregards the socioeconomic and beneficial aspects of groundwater development. Literature on the environmental effects of groundwater development describes the use of groundwater for irrigation and livestock production and the response of the aquifer to groundwater pumping. The latter includes topical discussions of the impact of wells on spring and groundwater flow, vegetation, drainage, groundwater quality, and topography. In regard to the socioeconomic impact of groundwater development on health and cultures, two case studies are presented. That of the Papago Indian illustrates the cultural and subsequent environmental changes occurring when an assured groundwater supply is developed within an area of previous water scarcity, inhabited by a nomadic people. In the case of Pakistan, it is demonstrated that groundwater development can play an important role in the economies of arid, developing countries. In general, groundwater development can cause considerable environmental and social change. The former includes deterioration of groundwater quality; subsidence, fissuring, and faulting of the land surface; changes in erosional regimes; destruction of

vegetation; and decline of spring and stream flows. Cultural changes are most dramatic when groundwater development is undertaken in nomadic economies. Both the physical and socio-economic impacts of groundwater development depend ultimately, however, upon the amount and rate of water withdrawal, and are influenced by the cultural-institutional setting which dictates the response to groundwater development, how water is used, what is permissible, and what is economic.

AID/ta-G-1111 211(d) 931015900

034 **PN-AAH-588**

EVALUATION AND IMPROVEMENT OF IRRIGATION SYSTEMS

Peri, G.; Skogerboe, G.V.
Colorado State University, Engineering Research Center.
1979, 99 p.

In Water Management Technical Report No. 49A

Inefficiencies in water delivery and irrigation practices in LDC farming may lead to lower yield per unit of area and per unit of water, less total area irrigated, and detrimental environmental effects, as well as to lower returns from the irrigated crops. This report suggests a comprehensive procedure for evaluating and improving LDC irrigation systems. The procedure is based on the analysis of the performances of the system for an individual application (a single episode of applying water), along with the irrigation management regime (intervals and depths of application), resulting in an analysis of the whole irrigation season. The report follows a similar format. Performance evaluation of an individual irrigation application is based on the water distribution profile after irrigation. Efficiencies and coefficients that describe the irrigation are derived directly from the water distribution profile. Based on these efficiencies, the irrigation performance can be determined and classified into the appropriate performance categories. The seasonal irrigation regime parameters can be determined on the basis of given yield functions and yield and irrigation costs, so that desirable levels of application intervals and depths can be obtained. The overall irrigation season can therefore be quantified by parameters affecting the water distribution profile (distribution uniformity and delivery, deep percolation, and storage efficiencies) and by those influencing the extent of the irrigation season (marginal water costs, yield-water economic relations, crop water use efficiency, and yield per unit of area). In addition, environmental and economic inputs are important in quantifying the overall and seasonal levels of performance. Although the levels of these parameters can all be directly determined for evaluating overall crop yield performance, the performance of the irrigation regime and of the individual application should be considered for improvement decisions. A list of 61 Water Management Technical Reports available from Colorado State University and a bibliography of seven references specific to this report (1967–78) are included.

AID/ta-C-1411 931048900

035 **PN-AAH-589**

EVALUATION AND IMPROVEMENT OF BASIN IRRIGATION

Peri, G.; Skogerboe, G.V.; Norum, D.I.
Colorado State University, Engineering Research Center.
1979, 199 p.

In Water Management Technical Report No. 49B

Surface irrigation methods can be classified into two major groups, flood irrigation and furrow irrigation. Flood irrigation methods differ because of slope, discharge, and field size (basin, border strip, border ditch, etc.). This report outlines a procedure for the design and evaluation of basin irrigation systems. The first section describes the general characteristics of basin irrigation, showing the interactions between the various basin characteristics, and the operational, management, and performance parameters. The second chapter presents a field evaluation of water distribution patterns for basins where water distribution is irregular. Possible methods for estimating the distribution pattern and evaluating irrigation performance include direct field depth estimations, recession pattern measurement, the excess application method, and the ponded water method. Theoretical water distribution models, which are the subject of the third chapter, can be developed and used only for regular basins with certain characteristics. A general model is discussed by considering the various functions upon which it must be based (infiltration, advance, recession). A simplified model applicable to both level and sloped basins is also presented. These models allow the prediction of the water distribution and water performance, but some field tests are still necessary for control purposes. The fourth chapter deals with the use of water distribution models for improving irrigation. Methods differ for regular and irregular basins. Various case studies are presented here for improving irrigation performance in regular basins, utilizing the results of the simplified model. The final chapter presents the method for improving basin irrigation by land preparation, which becomes necessary with irregular basins. Appended to the report are a field evaluation of the infiltration equation for basin irrigation, a list of 61 Water Management Technical Reports available from Colorado State University, and a bibliography of 33 references specific to this report (1946–78).

AID/ta-C-1411 931048900

036 **PN-AAH-590**

EVALUATION AND IMPROVEMENT OF BORDER IRRIGATION

Peri, G.; Norum, D.I.; Skogerboe, G.V.
Colorado State University, Engineering Research Center.
1979, 121 p.

In Water Management Technical Report No. 49C

Border irrigation is a method of controlled surface flooding involving a rectangular field bounded by dikes along its longer dimension to restrict the lateral flow of water. This report is concerned with the evaluation and improvement of the graded border type in which there is a gentle and uniform slope in the direction of

irrigation. The general characteristics of border irrigation are dealt with first, including the water distribution pattern and the general relationships between the border irrigation results and operating conditions. The second chapter deals with evaluation of border irrigation based on field tests. This requires the estimation of the infiltration equation and the advance and recession for specific inlet stream and border parameters (slope, length, surface). Shut-off time and inlet stream size give the total quantity of water delivered into the border, evaluation of the quantity of water absorbed requires measurement of the runoff, and determination of the water quantities in terms of depths requires the measurement of the dimensions of the border. A lengthy description of how this data is utilized in such evaluations is included. The third chapter deals with the improvement of border irrigation performance by field tests. Improvement of irrigation performance is related to changes in inlet unit stream size, cutoff time, and length of the border, since changing the slopes, surface roughness, and infiltration is generally impractical. The last chapter deals with theoretical border irrigation models which allow evaluation and improvement of irrigation performance requiring only limited amounts of preliminary field work. The input data required for the several different models available include infiltration data; border slope, length, and surface roughness; inlet stream size; and cutoff time. These models are described, as are the processes for applying them. A list of 18 available border irrigation models, a bibliography of 20 references specific to this report (1965–79), and a list of 61 Water Management Technical Reports available from Colorado State University are also included.

AID/ta-C-1411 931048900

037 PN-AAH-591

IRRIGATION AND HONOR: CULTURAL IMPEDIMENTS TO THE IMPROVEMENT OF LOCAL LEVEL WATER MANAGEMENT IN PUNJAB, PAKISTAN

Merrey, D.J.
Colorado State University, Engineering Research Center.
1979, 61 p.

In Water Management Technical Report No. 53

Inadequate organization of irrigation water users is now recognized as the major constraint to improving on-farm water management in Pakistan. This report, based on a detailed study of one village, describes a major theme in Punjabi culture — the concept of "izzat", meaning honor or reputation, and how this relates to irrigation. After a brief introductory section, a summary of the sociological findings of the village study is presented. The central mobilizing social unit at the village and watercourse level is the "biraderi" (brotherhood). Communities characterized by two (or more) large biraderis of agriculturalists of about equal size and power will exhibit a greater tendency toward polarization, and therefore will be more difficult to organize for collective projects. The third section contains a discussion of the concept of culture, and how the rules and standards of a group of people may affect the success of a newly implemented form of organization. Next, a case study of an experimental attempt at carrying out village-level watercourse improvement in Pakistan is presented. The concept of izzat and its implications for establishing local level organizations are then explained. The concern for preserving or increasing one's izzat, or reducing others' izzat, generates conflict and competition among people and discourages cooperation. Given the sociocultural characteristics summed up in the concept of izzat that seem to prevent rural Punjabis from organizing and cooperating, a three-pronged strategy is suggested in an attempt to foster badly needed local watercourse improvement and maintenance initiatives: (1) establish legal and administrative mechanisms to facilitate organization; (2) build in rewards to attract farmers to organize and then maintain cooperative watercourse efforts; and (3) apply sanctions to individuals and groups who sabotage organizational efforts and to local communities who lag behind in such organization. A list of 61 Water Management Technical Reports available from Colorado State University and a 33-item bibliography of references specific to this report (1963–79) are included.

AID/ta-C-1411 931048900

038 PN-AAH-592

ORGANIZATIONAL PROBLEMS AND THEIR CONSEQUENCES ON IMPROVED WATERCOURSES IN PUNJAB

Mirza, A.H.; Merrey, D.J.
Colorado State University, Engineering Research Center.
1979, 207 p.

In Water Management Technical Report No. 55

Based on an intensive survey of 10 improved watercourses in Punjab, Pakistan, this study shows the inadequacy of present forms of social organization of watercourses for ensuring their adequate maintenance. The first chapter discusses the study's objectives, its theoretical background, and the hypotheses guiding the research. Chapter two presents basic sociological background data on ten sample watercourses and proposes criteria for predicting the likelihood of success of an improvement project on particular watercourses. Chapter three discusses the process of watercourse improvement, including conflict and cooperation patterns, functioning of "watercourse committees", relationships among farmers and On-Farm Water Management(OFWM) Pilot Project personnel, participation of shareholders in the project, and farmers' perceptions of the effects of improvement. Chapter four focuses on the quality of watercourse maintenance and how this is affected by various sociological characteristics of the watercourse, while chapter five discusses sample farmers' reactions to the idea of establishing Water User Organizations. The final chapter summarizes the study's findings, discusses their implications, and makes recommendations both for immediate use by the OFWM Project and for further research in actively organizing experimental water user organizations. The study suggests the following sociological characteristics as conducive to good watercourse maintenance: (1) a large percentage of landholdings in the 6.5–25 acre range; (2) relatively equal distribution of power and influence among a large number of farmers on the watercourse; (3) relatively high levels of institutional services available; (4) previous history of cooperation; and (5) a small number of

watercourse shareholders. The authors encourage the OFWM personnel to strive for maximum possible farmer participation in the project and to try out new ideas in water management. A design for further research is also outlined. A list of 64 Water Management Technical Reports available from Colorado State University and a 20-item bibliography specific to this report (1965–79) are also included.

AID/ta-C-1411 931048900

039 **PN-AAH-593**

OPTIMIZATION OF LENGTHS OF ALTERNATIVE WATERCOURSE IMPROVEMENT PROGRAMS

Reuss, J.O.
Colorado State University, Engineering Research Center.
1980, 61 p.

In Water Management Technical Report No. 57

In Pakistan, some 80,000 watercourses serving over 30 million acres operate on a fixed rotation basis in which water is delivered for a fixed time to successive outlet points along the channel. Heavy losses of water occur along these channels, and this has been identified as a major Pakistani development problem. This report puts forth a sound theoretical basis and develops computational methods for choosing between the alternative methods of construction or improvement of such watercourse systems. This task is made difficult by the fact that various sections of these systems will have vastly different use times, and these differences in utilization markedly affect the benefits derived from lining or other improvements on any particular section. After a brief introductory section, four theoretical considerations for evaluating alternatives (the linear loss assumption, nonlinear loss assumptions, the branched watercourse case, and distribution of benefits) are presented. The factors considered in the analyses as controlling the selection of an improvement or construction method include the annual cost per unit length, the expected water loss associated with each alternative, and the value of the water. Computational methods are developed for determining the optimum points for changing lining methods, and for quantifying benefits of improvement accruing to users throughout the system. The main body of the text concludes with discussion of these theoretical considerations and conclusions. The first major conclusion is that, depending on use time, net benefits are generally maximized when different construction methods, such as concrete lining and earthen improvements, are applied to various sections. Secondly, the major beneficiaries to improvement of high use sections are the downstream users that may be located on reaches where high cost improvements may not be economically feasible. A list of 66 Water Management Technical Reports available from Colorado State University and an 8-item bibliography of references specific to this report (1974–79) are also included.

AID/ta-C-1411 931048900

040 **PD-AAC-100**

EVALUATION OF THE KENYA NATIONAL RANGE AND RANCH DEVELOPMENT PROJECT

Axinn, G. H.; Birkhead, J. W.; Sudholt, A. W.
Devres, Inc.
1979, 179 p.

A multidonor project designed to increase the quantity and quality of livestock production in Kenya was initiated in 1974. This in-depth study evaluates the A.I.D. portion of that project. The multi-donor project was designed to develop ranches, feedlots, rangelands, and wildlife areas, as well as to expand market facilities and provide technical services and training. A.I.D. financing was limited to equipment and support services for rangeland development, cattle purchases for the ranching program, and a meat processing feasibility study. After an introduction concerning the project purpose and history and the evaluation strategy, the report continues with a detailed discussion of the project's design and component parts. Subsequent sections evaluate the effectiveness and appropriateness of A.I.D. inputs and the progress achieved in the livestock marketing area. Next, the environmental impact and sociological effects of the project are discussed. Finally, a review of current planning and some thoughts for the future are included. The evaluation team found that although some project achievements have been outstanding, they often fell short of unrealistic project goals. Especially disconcerting were the unrealistically short time frame allowed for goals to be reached and the absence from the plans of contingency provisions in the event of a drought. Among the positive project consequences were the sensitivization of technicians, financiers, planners, and international donors to the realities of a fragile environment and the reduction of friction between tribal clans. Some 39 recommendations were made concerning general project design and strategy; economic, ecological, and sociological considerations; and project implementation, including the interesting conclusion that, although the expansion of cattle production over the short run should be fostered by permitting cattle prices to rise, it is not in the long-term interest of the people of Kenya to increase present livestock numbers. An executive summary, 17 annexes, and an 89-item bibliography (1961–79) are also included.

AID/AFR-C-1558 615015700

041 **PN-AAG-756**

EVALUATION OF THE PRODUCTIVITIES OF MAURE AND PEUL CATTLE BREEDS AT THE SAHELIAN STATION, NIONO, MALI

International Livestock Center for Africa (ILCA).
1978, 110 p.

In ILCA Monograph No. 1

From 1966 to 1975, the Sahelian Station at Niono, Mali, maintained substantial herds of two typical African breeds of Zebu cattle, the Maure and the Peul, together with their crosses, in order to collect comparative data in the areas noted below. This report is an analysis of these data performed by the International Livestock Center for Africa. The animals were kept for milk and meat produc-

Masai livestock graze on Tanzania's rangelands.

tion and for draft purposes. They were maintained by improved management practices such as supplementary feeding, controlled breeding, and veterinary care. An introduction describes the animal production system at Niono, together with the preparation of the data for analysis and the analytical method used. Research results are then presented in regard to reproductive performance and productivity; milk yield and composition; mortality; body weight; maternal ability; and linear measurements. No breed differences are found in terms of age at first calving, the calving interval, butterfat levels, and mortality rates. The Maure and the Maure/Peul crossbreed are 13% superior to the Peul in annual total milk yield. Breed differences in growth rates suggest that Maure and Maure/Peul crossbreed dams provide a 7% superior maternal environment as compared with Peul dams. Cow productivity estimates indicate that the average cow produces 418 kg milk/year; 0.68 of a weaner calf weighing 54.4 kg; and 47.4 kg of its own final live weight. Over its 10-year lifetime, each cow produces 2,717 kg milk; 4.4 weaner calves weighing 354 kg; and 308 kg of disposable body weight. The Maure is 13% superior to the Peul in cow productivity, and the Maure/Peul crossbreed is 2% superior to the Maure. Analysis results are compared with related data of known production systems in African environments comparable to that of Niono. Initial results have pinpointed many gaps in individual trait values, but further research is needed to fill gaps before productivity comparisons can be meaningfully constructed. Appended is a 40-item bibliography of English, French, and German language report-related titles (1947–76).

AID/ta-G-1497 931031100

042 **PN-AAH-219**

SWINE PRODUCTION SYSTEMS: AN EXPLORATORY ANALYSIS OF RESEARCH PROBLEMS AND ALTERNATIVES IN SELECTED COUNTRIES OF TROPICAL LATIN AMERICA

Nores, G.A.; Gomez, G.
Centro Internacional de Agricultura Tropical (CIAT).
1979, 33 p.

Swine production in Latin America is very inefficient. While the swine population in that region represents 11% of the world's total, it actually produces only 4.6% of that total. The region's low productivity has been attributed to a group of interrelated factors, the most critical of which is generally agreed to be the lack of quality feed for efficient swine nutrition. The present study was undertaken to explore this hypothesis and to determine if and what types of research and training programs would help to alleviate the problem. Representative examples of swine production systems in Bolivia, Colombia, Ecuador, Guatemala, and Paraguay were selected for study. Analysis of swine production and of per capita production of energy and protein sources revealed that during 1960–76 there was no apparent improvement in swine productivity and that this low productivity is attributable to the low availability of feedstuffs (absolute deficit) and the relatively low availability of protein (relative protein deficit vs. calories) available for swine nutrition. In addition, analysis of swine production systems revealed that swine production in these countries is for the most part closely linked to the overall farm systems of which these operations form a part. Recommended are: (1) further research on the characteristics of the most relevant production systems in terms of the availability of and access to production factors, including management capacity for incorporating new technology, the opportunity cost of their resources, and the role of swine activities within the farm systems; (2) development and adaptation of technology applicable to the small production strategy; (3) research on the development of high quality protein sources

(maize and sorghum), grain legumes (soybeans, cowpeas, and peanuts) and forage legumes specifically adapted to the region's environment; and (4) evaluation of the performance of native breeds and cross-breeds under the subfeeding conditions prevalent in existing production systems. The training of professionals to strengthen swine research and development programs at the regional level is also recommended. Fourteen pages of illustrative tables and charts accompany the report.

AID/DSAN-G-0076 931086500

043 **PN-AAH-238**

REPORT OF THE WORKSHOP ON PASTORALISM AND AFRICAN LIVESTOCK DEVELOPMENT, HARPERS FERRY, WEST VIRGINIA, 1979

Institute for Development Anthropology (IDA).
1979, 86 p.

During three days in September 1979, the AID-sponsored Workshop on Pastoralism and African Livestock Development was held in Harpers Ferry, West Virginia, attracting some 80 participants from a variety of countries, organizations, and specialties. This group examined the principal social, economic, and environmental assumptions which underlie livestock sector interventions in semiarid regions of Africa. The positions advanced in this report emerged from the discussions and presentations at this workshop. The report begins with a section on conclusions. There was a general consensus at the workshop that, if livestock sector programs and projects are to have favorable and beneficial impacts on producer populations, national wealth, and environmental conditions, they must be reoriented to make them more compatible with the social, economic, and environmental realities of African arid and semiarid pastoral regions. A set of general principles were generated which may serve as a tentative guide for action in this area: (1) quantitative data relating to pastoral systems are notoriously unreliable; (2) management units for development interventions in the livestock sector should be small-scale and based on existing cultural-ecological systems; (3) various kinds of mobility are both crisis-survival mechanisms and effective strategies for long-term exploitation of the range; (4) semiarid rangelands can experience considerable biological and climatic stress without necessarily resulting in long-term degradation; (5) the prime emphasis on livestock sector interventions at this time should be to support the subsistence base of pastoral herding rather than to use commercial activities; and (6) monitoring and evaluation should be made integral components of every program and project in the livestock sector. Included in the report are summaries of the workshop discussions, which covered: range degradation and productivity, program and project objectives, institution building, marketing, case studies, and implications for policy, programs, and project design. Appendices listing the participants, outlining the agenda, and indicating the result of a participant questionnaire distributed in advance are also included.

AID/otr-G-1741 930004700

044 **PN-AAH-563**

SMALL RUMINANT PRODUCTION IN THE HUMID TROPICS

International Livestock Center for Africa (ILCA).
1979, 127 p.

In ILCA Systems Study, No. 3

In 1978, the International Livestock Center for Africa conducted an extensive literature review and a survey mission to four West African countries — Ivory Coast, Ghana, Togo, and Nigeria — concerning small ruminant production in the tropics. The main constraint on the production of these animals is the high incidence of disease, although veterinary knowledge and treatment have already been developed which could substantially alleviate this problem. Therefore, this study focuses on the more effective application of existing knowledge to traditional production systems. The study begins with a background section, describing the climate and ecology, population and livestock numbers, and crop and livestock production in the tropics of West and Central Africa. Information concerning the genetic resources and production parameters of breeds of dwarf sheep and goats in these areas is then presented, along with strategies for genetic improvement. Next, the reproductive performance of sheep and goats is discussed, followed by a treatment of animal nutrition and tropical forages. The latter section concludes with an estimate of potential livestock production based on tropical pastures. The fifth chapter examines fodder production in the region, since intensified fodder production systems will be required as improved management and disease control increases the number of small ruminants. The sixth section discusses a substantial resource for supplementary livestock feeding, namely the abundant and varied agroindustrial byproducts present. Chapter seven deals with housing to protect the animals from rainfall and heat. Animal health is treated next, in terms of different diseases, parasitic infestations, and other animal health problems. Following this, the wider economic considerations involved in goat and sheep production in the humid zone are discussed. The economic efficiency of small ruminant production is considered from the perspective of the individual farmer and of the national economy. Finally, proposals for further research are summarized. An appendix of livestock data and a 223-item (1942–79) bibliography of French and English language references are also included.

AID/DSAN-C-0081 931031100

045 **PN-AAH-564**

LIVESTOCK PRODUCTION IN THE SUBHUMID ZONE OF WEST AFRICA: A REGIONAL REVIEW

International Livestock Center for Africa (ILCA).
1979, 184 p.

In ILCA Systems Study, No. 2

The subhumid zone of West Africa, which includes portions of Senegal, Guinea-Bissau, Guinea, Sierra Leone, Mali, Ivory Coast, Upper Volta, Ghana, Togo, Benin, Nigeria, and Cameroon, represents a valuable agricultural resource. The zone's abundant grass

cover provides a rich potential for forage and grain production, but remains underexploited, with a relatively low human and livestock population. The zone's most important climatic feature is its total annual mean rainfall, which ranges from 1,000 to 18,000 mm. Thus, rainfall in this zone tends to be more reliable and the ecosystem less fragile than in the arid areas to the north, where large-scale cattle production has traditionally been focused. If the risk of trypanosomiasis can be reduced or removed, livestock production could be substantially increased. This report is based on the results of a symposium held in Kaduna, Nigeria in March 1979, cosponsored by the International Livestock Center for Africa and the National Animal Production Research Institute. Major topics discussed in the report include the zone's environmental features, its primary livestock producers (the Fulani pastoralists), fodder resources and management, livestock resources and management, animal health, tsetse-transmitted trypanosomiasis, land use and development strategies, and future research. Two types of development are envisaged for this zone. On arable land, mixed farming systems could be developed, integrating livestock and crop production; in areas which are too dry (or otherwise unsuitable for cropping), livestock production would continue to be based primarily on natural pastures, with a gradually increasing emphasis on meat production. Future research should emphasize the monitoring of rangeland vegetation, basic information on the livestock production system of the pastoralists, information on sheep and goat production, efforts to determine the effects of subacute trypanosomiasis, as well as a precise demarcation of tsetse populations. A 31-page bibliography is provided (1900–77). A significant number of the publications are in French.

AID/DSAN-G-0081 931031100

046 **PN-AAG-678**

COLORIMETRIC ENZYME-LINKED IMMUNOSORBENT ASSAY FOR THE IDENTIFICATION OF STRAINS OF "RHIZOBIUM" IN CULTURE AND IN THE NODULES OF LENTILS

Berger, J.A.; May, S.N.; Berger, L.R.; Bohlool, B.B.
United States Department of Agriculture, Science and Education Administration.
1979, 5 p.

In Applied and Environmental Microbiology, Vol. 37, No. 3, 1979, pp. 642-646

An indirect enzyme-linked immunosorbent assay (ELISA) has been developed to identify strains of *Rhizobium* in culture and lentil nodules. This paper describes this colorimetric method, which was developed to meet the need for serological assays which are rapid and do not require elaborate or expensive equipment. After a general overview of the research accomplished, the materials and methods used to develop the ELISA are described. Basically, the test uses strain-specific rabbit antisera, sheep anti-rabbit globulin (SARG) conjugated to alkaline phosphates, culture and root bacteria, and immunofluorescent staining methods. In the ELISA tests bacteria from either culture or nodule, are first coated with a specific rabbit anti-*Rhizobium* serum and then with sheep anti-rabbit antibodies covalently linked to alkaline phosphates. A chromogenic substrate is then applied to the antibody smear, and the color is measured after a period of incubation. The amount of colored product is proportional to the amount of enzyme present, which in turn is indirectly related to the quantity of antigen on the slide. The ELISA is endowed with the specificity of antigen-antibody reactions and the sensitivity of enzyme-catalyzed reactions. Initial problems were encountered with the SARG conjugate adsorbing nonspecifically to rhizobial cells, but this was countered by pretreatment of the cells with bovine gamma globulin. The specificity of the ELISA was not lost when nodules, together with their bacterial content, were subjected to freezing or boiling. In cases where only a few strains of *Rhizobium* are to be studied, a faster, less sensitive direct ELISA may be used. Finally, the importance of this development is discussed. In every case, complete agreement was obtained between the ELISA tests and direct immunofluorescence tests used for confirmation. The former, therefore, enjoys the specificity of the latter, without requiring large amounts of antisera, microscopes, and a large central laboratory. Appended to the paper is an 11-item bibliography (1964–77) of literature cited.

PA/AG/TAB-610-9-76 931061000

047 **PN-AAG-828**

DEVELOPMENTS IN THE CONTROL OF POTATO VIRUSES: REPORT OF THE CIP PLANNING CONFERENCE, LIMA, PERU, NOV. 14-18, 1977

International Potato Center (CIP).
1977, 190 p.

The International Potato Center (CIP) is a non-profit research institution established by agreement with the Government of Peru and dedicated to developing and disseminating knowledge on use of the potato as a basic food. This report presents the proceedings of the fourteenth planning conference on developments in the control of potato virus diseases, held at CIP in Lima, Peru, 11/14-18/77. Eighteen international experts attended the conference to assist in developing a 5-year plan of action, including identification of priorities, for potato virus research. Sixteen papers written by conference participants concerning virus resistance, virus properties, virus testing, antiserum production, histological staining methods, methods for breeding virus resistant potatoes, virus detection, and plant virology, are presented. Major recommendations included the following: (1) breeding for resistance should have the highest priority in attempting to control potato virus diseases; (2) since reliance on the outcome of one testing procedure creates unacceptable risk, different and complementary methods like serology, electron microscopy, and the study of indicator plants, should be utilized; (3) the greatest research effort must be directed to improving and applying new developments; (4) potato virus research should include vector research and should focus on the use of botanical seed to produce crops on a farm scale; (5) pilot tests are needed to evaluate the use of cross protection as a short-term temporary solution to PLRV and PVX-PVY infection-related problems, the possible importance of DNA sequences in *Solanum* species complimentary to PSTV-RNA, and the possibilities of hybridization of *Solanum etuberosum* to make

use of PLRV immunity present in this species; (6) additional greenhouse facilities with environmental control possibilities should be provided for testing programs; (7) a 5-year review of the tentative status of the serologist is needed; and (8) high priority work can be accomplished only by a group of approximately five competent researchers. A list of conference participants, their prioritized recommendations, and the conference's agenda are included.

AID/ta-G-1271 931097300

048 **PN-AAH-207**

IMPORTANT DISEASES AND PESTS OF BEAN ("PHASEOLUS VULGARIS"), LIMA BEAN ("PHASEOLUS LUNATUS") AND PIGEON PEAS ("CAJANUS CAJAN") IN AFRICA

Kaiser, W.J.
United States Department of Agriculture, Agricultural Research Service.
1976, 6 p.

In African Journal of Plant Protection, Vol. 1, pp. 97-102

Bean (*Phaseolus vulgaris*), lima bean (*Phaseolus lunatus*), and pigeon pea (*Cajanus cajan*) are important food crops which provide a major source of protein in the diets of inhabitants of countries of Africa south of the Sahara. Diseases and pests contribute to erratic, low yields and the general poor quality of these legumes in the region. This study identifies important diseases and pests affecting those legumes together with known control methods. Beans are planted in an estimated 1,500,000 hectares in eastern Africa with an average yield of 500–750 kilograms per hectare. Numerous diseases affect beans in Africa including anthracnose, rust, angular leaf spot, halo blight, common bacterial and fuscous blight, and common mosaic virus. Insects are also a hazard. Most of these diseases are transmitted by seed, except rust which is transmitted by wet, humid weather conditions. Effective controls include the use of pathogen-free seed, crop rotation, disease-resistant varieties, and application of chemicals. Lima beans are infected by many of the diseases which plague beans as well as by *Ascochyta phaseolorum* which affects foliage. Also, white fly-transmitted viruses are problematic. These viruses can be controlled by planting of clean seed and chemical application. Pigeon peas are a drought-resistant crop cultivated on soils of low fertility. Important diseases of this crop are wilt, rust, powdery mildew, and nematodes as well as foliage, stem, root, and seed diseases. White fly- and mite-transmitted viruses are also a problem. Pests, such as the American bollworm and cowpea bruchids, are the most important factor limiting the yield and quality of pigeon peas in Africa. These can be controlled by applying insecticides. The report includes various references to books and articles on pests and diseases. A 38-reference bibliography covering the period 1939–75 is appended.

PA/RA(AJ)-03-00 RES

049 **PN-AAH-208**

NOTES ON EAST AFRICAN PLANT VIRUS DISEASES: II. ALFALFA MOSAIC VIRUS

Kaiser, W.J.; Robertson, D.G.
United States Department of Agriculture, Agricultural Research Service.
1976, 8 p.

In East African Agricultural and Forestry Journal Vol. 42, No. 1, pp. 47-54

Alfalfa mosaic virus (AMV) was isolated from naturally infected lucerne (alfalfa) in Tanzania and potato in Kenya. This was the first record of AMV from East Africa. This article reports on the isolation methods used and on follow-up studies conducted to investigate the virus' properties, including host range and transmission methods. Plants were grown in steam sterilized soil in glasshouses at 15-25° C. Insects were controlled by use of 20% Vapona resin strips and pesticide sprays with wide spectrum insecticides. The lucerne isolate was maintained in *Nicotiana clevelandii* gray and the potato isolate in *Nicotiania tabacum* "White Burley". Sap from systematically infected leaves was used for host range, physical property, purification and serological studies. Host range studies were made by manual inoculation with sap extracted from AMV infected leaf tissue. The leaves of the test plants were previously dusted with carborandum, and rinsed with water immediately after inoculation. Plants that did not develop symptoms were tested for latent infection by back inoculation to bean cv. Long Tom. Physical properties were determined with crude infective sap of *N. clevelandii* and clarified sap of *N. tabacum* for the lucerne and potato isolates. Vector transmission studies were conducted using *Aphis craccivora Koch, Macroisphum euphorbiae* and *Myzus persicae Sulz*. These were starved for two hours and then given test feedings. Plants were then immediately sprayed with an aphicide. Leaves of *N. clevelandii* systematically infected with the lucerne isolate were homogenized in phosphate buffer, and centrifuged, made into pellets, and centrifuged again in the phosphate buffer. This was done to purify the virus. An antiserum was prepared by injecting rabbits intravenously with a partially-purified lucerne isolate and later with an intramuscular injection. A few days later they were injected again. Rabbits were bled 28 days later. Results of this study were that the lucerne isolate affected plants in 29 genera from 7 families while the potato isolate infected 27 genera in 7 families. An 8-item bibliography (1956–76) is appended.

PA/RA(AJ)-03-00 RES 618065700

050 PN-AAH-209

INSECT TRANSMISSION OF PATHOGENIC XANTHOMONADS TO BEAN AND COWPEA IN PUERTO RICO

Kaiser, W.J.; Vakili, N.G.
United States Department of Agriculture, Agricultural Research Service.
1978, 7 p.

In Phytopathology, Vol. 68, pp. 1057-1063

Bacterial blight of bean and cowpea caused by three pathogenic xanthomonads — *Xanthomonas phaseoli* (Xp), *X. phaseoli* var. *fuscans* (Xpf), and *X. phaseoli* f. sp. *vignicola* (Xpv) — are often important plant diseases during the rainy season in Puerto Rico. Because bacterial blight lesions on these two plants are frequently associated with insect-feeding injuries, this study was initiated to determine whether insects were in fact partly responsible for the dissemination and transmission of the pathogens. After a brief introduction, the study materials and methods are outlined. Both healthy and bacterial blight-infected bean leaves with insect injuries were collected from experimental plantings. Bacterial isolations were made from blight lesions associated with insect damage, from those not associated with insect damage, from insect-feeding injuries without bacterial blight symptoms, and from insect washings. The test plants were then inoculated, insect-feeding tests conducted, and the survival of *Xanthomonas* isolates tested. Most insect-feeding damage to bean and cowpea appeared to be caused by two beetles, *Cerotoma ruficornis* and *Diaprepes abbreviata*, and infection of the test plants by pathogenic xanthomonads took place at the feeding sites of naturally-infested beetles. Infection also resulted when these and two other insect species were artificially infested with different bacterial isolates. However, no infection occurred after 48 hours when the beetles were infested and transferred at daily intervals to healthy test plants. Feeding injuries caused by infested beetles on noninoculated leaves or by noninfested beetles on inoculated leaves greatly enhanced blight lesion development. Bean blight bacteria were isolated from fresh feces of beetles which had fed on infected bean leaves. Several xanthomonads survived for periods up to 19 days on the bodies of live or dead beetles. A concluding section discusses these results. The study confirms that different insect species are vectors of bean blight bacteria, with *C. ruficornis* being identified as the predominant vector under field conditions in Puerto Rico. An 11-item bibliography of literature cited (1957–75) is appended.

PA/RA(AJ)-03-00 RES

051 PN-AAH-210

A "PHYTOPHTHORA" STEM CANKER DISEASE OF PIGEON PEA IN PUERTO RICO

Kaiser, W.J.; Melendez, P.L.
United States Department of Agriculture, Agricultural Research Service.
1978, 3 p.

In Plant Disease Reporter, Vol. 62, No. 3, pp. 240-242

Pigeon pea (*Cajanus cajan*) is the most important food legume cultivated in Puerto Rico. An important industry has developed around this crop to provide fresh, frozen, and canned pigeon peas for local and export markets. Starting in 1973, a new stem canker disease of pigeon pea caused by *Phytophthora parasitica* was observed in experimental and commercial plantings at several locations in Puerto Rico. This article reports on this new disease. The pathogen induced necrotic and often depressed lesions on main stems, branches, and petioles of pigeon pea plants. Foliage above cankers usually wilted and died. Isolates of *P. parasitica* from eggplant, pigeon pea, and tomato were pathogenic to pigeon pea stems in laboratory and greenhouse inoculation trials described in this article. Optimum temperature for growth of the isolates on V-8 juice agar was 30° C. In laboratory studies, isolates infected pigeon pea stem pieces at temperatures of 15-30° C, with an optimum of 25-30° C. Wounding of stem tissues favored infection by all isolates. In greenhouse inoculation studies with five isolates of the pathogen, no infection occurred in 8 days in the absence of wounding. Pigeon pea isolates were more virulent to pigeon peas in laboratory and greenhouse inoculation trials than were isolates from eggplant and tomato. In discussing the results of these trials, the authors comment that it is not known whether sources of resistance to *P. parasitica* occur in pigeon pea. If the canker disease becomes more widespread and damaging in Puerto Rico, it may be necessary to screen the pigeon pea germplasm collection maintained by the University of Puerto Rico to locate sources of resistance to the pathogen that can be used in a breeding program to develop new commercially acceptable, disease-resistant varieties.

PA/RA(AJ)-03-00 RES

052 PN-AAH-211

TWO BACTERIAL DISEASES OF COWPEA IN EAST AFRICA

Kaiser, W.J.; Ramos, A.H.
United States Department of Agriculture, Agricultural Research Service.
1979, 5 p.

In Plant Disease Reporter, Vol. 63, No. 4, pp. 304-308

Cowpea (*Vigna unguiculata*) is one of several legumes that are cultivated as a human food crop in East Africa, particularly in the warmer, lower elevation areas around Lake Victoria and along the East African Coast. Numerous diseases and pests affect the cowpea, contributing significantly to their low yields and poor quality wherever they are grown in Africa. Of the diseases affect-

Cowpeas are examined for disease.

ing cowpeas in Africa, the least appears to be known of those caused by bacteria. In East Africa, the authors of this document have observed cowpeas infected by two seedborne xanthomonads that produced distinct and different disease symptoms on the foliage. These symptoms, bacteriological tests, and pathogenicity of the xanthomonads, as well as a description of collection and processing methods of pathogen cultures are presented in this report. The bacteria causing cowpea bacterial blight (CBB) and cowpea bacterial pustule (CBP) were indistinguishable in cultural, morphological, and physiological properties, and in their pathogenicity to different legume species. Both infected several *Phaseolus* and *Vigna* species. Isolates of CBB and CBP could be differentiated only by the symptoms that they produced on cowpea foliage. Both bacteria are considered to be strains of a member of the *Xanthomonas campestris* group. East African isolates of CBB and CBP could be differentiated from the bacterium causing fuscous blight of bean *X. phaseoli*. var. *fuscans* (Xpf) by their pathogenicity to bean and cowpea. The CBB and CBP pathogens were pathogenic to both bean and cowpea, whereas Xpf was pathogenic to bean only. Literature cited at the conclusion of the report includes 16 entries (1963–78).

PA/RA(AJ)-03-00 RES 618065700

053 **PN-AAH-212**

USE OF TISSUE CULTURE AND THERMOTHERAPY TO FREE EAST AFRICAN CASSAVA CULTIVARS OF AFRICAN CASSAVA MOSAIC AND CASSAVA BROWN STREAK DISEASES

Kaiser, W.J.; Teemba, L.R.
United States Department of Agriculture, Agricultural Research Service.
1979, 5 p.

In Plant Disease Reporter, Vol. 63, No. 9, pp. 780-784

Cassava is an important food crop in East Africa and the most important disease affecting cassava is African Cassava Mosaic (ACMD). Cassava brown streak disease (CBSD) is another important disease of the cassava. This study presents results of research undertaken to develop methods to free cassava from ACMD and CBSD, using meristem-tip culture and thermotherapy. The etiology of AMD is unknown, but evidence suggests that it is a virus. It is transmissible by grafting, white flies, and mechanical inoculation. ACMD induces leaf distortion on both old and young leaves. CBSD causes rod shaped and isometric particles on the leaves of cassava plants and affects only mature leaves. To develop the methodology used in the research, stakes of cassava were cut into sections with at least four nodes. The upper, exposed end of each stake was sealed with wax and the stakes were planted into a steam-sterilized mixture of sand and soil and placed in a room under optimum conditions for growing. Meristems were excised from the plants every few days. Shoots were surface-sterilized and then placed into agar culture mediums in test tubes; heat treatment was given to some plants before excision of meristems. Regenerated plants were indexed for ACMD and CBSD at various intervals during the course of these studies. All regenerated plants were cut back and stem pieces were rooted and observed for disease symptoms. Callus tissue began forming on the basal portions of excised meristems within 4-5 days and shoot differentiation started in 14-15 days. Regenerated plants were transferred from culture tubes to sand in less than 60 days. Heat treatment of cassava plants before excision of meristems significantly increased the proportion of ACMD- and CBSD-free plants. All regenerated plants that remained symptom free were multiplied with rapid propagation techniques. A 14-item bibliography covering the period 1938–78 is appended.

PA/RA(AJ)-03-00 RES 618065700

054 **PN-AAH-213**

LEAF-SCORCH DISEASE OF SUGARCANE IN KENYA CAUSED BY A NEW SPECIES OF "LEPTOSPHAERIA"

Kaiser, W.J.; Ndimande, B.N.; Hawksworth, D.L.
United States Department of Agriculture, Agricultural Research Service.
1979, 14 p.

In Mycologia, Vol. 71, No. 3, pp. 479-492

Kenya's sugarcane production is threatened by a new foliar disease caused by *Leptosphaeria bicolor*. This document discusses this pathogen, its life cycle, distribution, taxonomy, morphology, cultural characteristics and pathogenicity. In Kenya, over 50 sugarcane fields were surveyed and the disease was located only in the Western Province. The initial disease symptoms appear on sugarcane leaf blades as small, red-to-dark-brown spots, characteristically surrounded by a brownish-yellow halo. The spots eventually turn reddish and may enlarge. The centers of the older lesions are straw colored and surrounded by a reddish margin. In severe cases, most of the leaf lamina becomes scorched. Both the perfect and the imperfect (*Stagonospora*) stages of the pathogen developed in pure cultures initiated from single ascospores. *L. bicolor* varied in mycelial growth, pycnidial formation, and conidial production. Maximum mycelial growth occurred on the oatmeal agar (OA). Pycnidial formation was most apparent on OA and malt agar. Optimum temperature for mycelial growth on potato dextrose agar was 27° C. The perfect state of *L. bicolor* did not develop in the nutrient media, but formed within 10-15 days on a natural water-agar medium containing autoclaved sugarcane-leaf pieces. In controlled inoculation studies, *L. bicolor* was pathogenic to the sugarcane leaves of varieties Co421, Co775, H37/1933, and NCo 376. It is recommended that if the disease becomes widespread, the most practical control measure would be to screen sugarcane varieties for resistance to the pathogen. Little is known about the environmental factors which favor infection, spread, and survival of *L. bicolor* under field conditions. Investigations of this kind would be helpful in explaining why disease severity appears to increase during the dry season and whether reservoir hosts are important in overseasoning of the pathogen. The perfect state in the disease cycle also requires further examination. A bibliography containing 12 sources (1950–77) written in English, German, and French is included.

PA/RA(AJ)-03-00 RES 618065700

055 **PN-AAH-214**

NATURAL INFECTION OF COWPEA AND MUNG BEAN BY ALFALFA MOSAIC VIRUS IN IRAN

Kaiser, W.J.
United States Department of Agriculture, Agricultural Research Service.
1979, 5 p

In Plant Disease Reporter, Vol. 63, No. 5, pp. 414-418

Cowpea (*Vigna unguiculata*) and mung bean (*Vigna radiata*) are two of several food legumes grown in Iran for human consumption. Alfalfa mosaic virus (AMV) is frequently encountered as a pathogen of these legumes in Iran. This article reports on a study initiated to describe the diseases of cowpea and mung bean caused by AMV and to investigate various properties of the virus. After a brief introduction, the study's methods and materials are outlined. Test tissue was derived from naturally infected cowpea and mung bean plants collected in various regions from 1966–71 as well as from plants grown in a greenhouse setting. Isolates of AMV were separated from other viruses and maintained in alfalfa, cowpea, or tobacco. Host range inoculation trials and insect transmission studies were carried out using standard procedures. Next, the results of the study are presented. Cowpea and mung bean plants naturally infected with AMV were typically stunted, and their foliage exhibited yellow mosaic (calico) symptoms, as did the pods of some infected cowpea accessions. The incidence of AMV in cowpea and mung bean plantings was usually less than 10%. Inoculation of cowpea in the field with AMV strains from cowpea or alfalfa at the full-bloom and pre-bloom stages reduced seed yields about 15% and 50%, respectively. No mortality of infected plants was observed in these studies. The virus was transmitted by the pea aphid (*Acyrthosiphon pisum*) in a stylet-borne (noncirculative) manner from AMV-infected alfalfa and cowpea to healthy cowpea. Seeds harvested from naturally or artificially infected cowpeas apparently did not transmit the virus. No resistance to AMV was detected among 56 cowpea lines inoculated with cowpea yellowing isolate under greenhouse conditions. A final section contains a discussion of these results. Cowpea and mung bean plants infected with yellowing strains of AMV invariably were found to be growing near alfalfa plantings. Cowpea fields were generally more severely affected by AMV than mung bean plantings, and the disease of mung bean caused by AMV appears to have had limited effect on agriculture in Iran. A 7-item bibliography of literature cited (1968–75) is appended.

PA/RA(AJ)-03-00 RES

056 **PN-AAH-215**

OCCURRENCE OF TOMATO BLACK RING VIRUS IN POTATO CULTIVAR ANETT IN KENYA

Kaiser, W.J.; Bock, K.R.; Guthrie, E.J.; Meredith, G.
United States Department of Agriculture, Agricultural Research Service.
1978, 5 p.

In Plant Disease Reporter, Vol. 62, No. 12, pp. 1088-1092

In the last 10 years, tubers of numerous potato lines have been introduced into Kenya for testing, with the aim of increasing potato production through breeding and selection of varieties resistant to important diseases, particularly late blight, bacterial wilt, and viruses. This article reports on a study to assess the relationship of the Anett isolate of the tomato black ring virus (TBRV) to other nepoviruses and to investigate the biological and physiological properties of the virus. After a brief introduction, the study's materials and methods are outlined. An isolate of TRBV from Anett potato collected at the Grasslands Research Station, Marindas, was used in all host range, seed and vector transmission, and serological studies. Next, the results of these studies are pre-

sented. The Anett isolate was serologically related to the beet ringspot virus group of TBRV. It did not react with antiserum to the type (tomato) strain of TBRV or to antisera of tobacco ringspot, tomato ringspot, or raspberry ringspot viruses. The host range of the Anett isolate was extensive and the virus was seedborne in several artificially inoculated food crops and weed hosts. The virus was not transmitted by aphids or the nematode *Longidorus laevicapitatus*, which occurs in soils of the potato-growing regions of Kenya. The article concludes with a discussion of these results. This is the first published report of TBRV on the African continent, and it seems likely that TBRV was introduced into Kenya in virus-infected Anett potato tubers. This illustrates the ease with which new and potentially dangerous pathogens, like TBRV, can be introduced into new areas when special precautions are not taken. The importance of strict observance of quarantine in importations of potatoes is thus emphasized. An 11-item bibliography of literature cited (1957–77) is appended.

PA/RA(AJ)-03-00 RES 618065700

057 PN-AAH-229

STUDY ON KRESEK (WILT) OF THE RICE BACTERIAL BLIGHT SYNDROME

Mew, T.W.; Vera Cruz, C.M.; Reyes, R.C.; Zaragoza, B.A.
International Rice Research Institute (IRRI).
1979, 10 p.

In IRRI Research Paper Series, No. 39

Bacterial blight caused by *Xanthomas oryzae* has three symptoms: leaf blight, kresek (wilt), and pale yellow. Kresek was first reported in 1950 in Indonesia and was assumed to be a new disease. In 1964, Goto, working at the International Rice Research Institute (IRRI), identified the causal bacterium as *X. oryzae* and confirmed that kresek is a symptom of the bacterial blight syndrome. Since then, kresek has been recognized in the Philippines, Malaysia, India, and Sri Lanka. Recent information from China and Korea indicates that kresek, while common in tropical Asia, is not restricted to the tropics. Early research has not succeeded in clarifying fully the pathological relationships between the three symptoms of the bacterial blight syndrome. The present paper reports on research undertaken at IRRI on kresek infection, methods of inoculation, and the relationship between varietal resistance to leaf blight and to kresek. Two strains of *X. oryzae*, the leaf blight strain PXO61 and the kresek strain PXO82, were used throughout the experiments. Pure cultures of the two strains were maintained and used on agar slants of potato or peptone sucrose medium (PSA) at -10° C. Inoculum of each strain was prepared on PSA from 72-h-old cultures. Kresek symptom of the bacterial blight syndrome developed on rice seedlings when they were inoculated by leaf-clipping or root-dipping. Kresek resulted with less frequency when older plants were infected with leaf blight. The pale yellow symptom was found to be a secondary effect of either leaf blight or kresek. The older the plants, the lower the percentage of kresek induced by root dip. There were varietal differences to kresek infection. IR1545 was as susceptible as IR8 from 9 to 16 days after sowing (DS), but only a minimum incidence of kresek was induced at 32 DS. Varieties such as IR20 and IR1545 are resistant to leaf blight but as susceptible as IR8 to kresek. Dipping seedling roots in zinc solution before transplanting reduced the incidence of kresek. The results suggest that varietal response to kresek infection may be different from that of leaf blight infection. A 14-item list of Japanese and English language literature cited (1950–79) is appended.

AID/DSAN-G-0083 931082600

058 PN-AAH-232

VARIATION IN VARIETAL REACTION TO RICE TUNGRO DISEASE: POSSIBLE CAUSES

Ling, K.C.
International Rice Research Institute (IRRI).
1979, 9 p.

In IRRI Research Paper Series, No. 32

Field tests have revealed that different rice varieties vary in their reaction to rice tungro disease. In 1975, for example, eight varieties showed three groups of reaction — resistant, intermediate, and susceptible — in different locations at different times. To investigate the causes of this variation, a Rice Tungro Virus (RTV) Collaborative Project involving seven collaborators in five countries was initiated in 1978. This project emphasizes experiments to determine variation caused by biotypes of RTV vectors or RTV strains. The present paper discusses causes of variation in varietal reaction to rice tungro disease other than those under study by the RTV Project. The variation may be due to mechanical errors, e.g., a variety shows a reaction in the field, but is noted differently in a notebook or publication. Causes of such errors are negligence in handling test materials, misidentification of the disease, difference in ability to score the reaction, and insufficient replicates (number of test plants per entry, number of replicates in a test, and number of repeated tests). The latter is especially important because the standard evaluation system for varietal resistance to tungro disease is based on the percentage of infected plants. Another cause of variation in varietal resistance is the difference in the field reactions of rice varieties. Such differences are caused by the existence of different biotypes of tungro vectors or strains among locations or tests, and variation in tungro disease pressure to the variety in the tests. Causes of the first type, that is, mechanical errors, are controllable and can be minimized or reduced through greater effort. Causes due to differences in varietal field reactions can be minimized by conducting repeated tests and computing an average reaction. The report concludes by noting that the vectors and strains currently under investigation by the RTV project may differ among locations, in which case a variety that is constantly resistant in a location or region would at least be useful in reducing tungro disease incidence in that location or region. An 8-item bibliography (1968–79) is appended.

AID/DSAN-G-0083 931082600

059 **PN-AAH-348**

THE IMPACT OF CREDIT, PRICES, TECHNOLOGY, AND EXTENSION ON FERTILIZER DEMAND IN RAINFED AREAS IN THE PHILIPPINES

David, C.C.; Gascon, F.B.; Barker, R.
Ohio State University Department of Agricultural Economics and Rural Sociology.
1979, 23 p.

Prepared for the Second International Conference on Rural Finance Research Issues, Paper No. 3

Most attempts to identify the impact of credit on fertilizer use in the Philippines have failed to separate the impact of credit from that of other factors such as price, technology, and extension. Such studies have also focused on irrigated farms, even though 75% of the country's rice lands are unirrigated. This document attempts to separate quantitatively the various factors affecting fertilizer use in the country's rainfed areas (related to the Rainfed-Upland Rice Project [RURP]). A conceptual model for analyzing the roles of these factors is presented first. Next, empirical estimates of fertilizer demand functions are given to calculate the impact of each factor on changes in fertilizer use between 1971 and 1977. This information is based upon a study of the RURP and the Masagana 99 Program (M99) in Bulacan and Nueva Ecija conducted by the International Rice Research Institute (IRRI). Constraints to fertilizer use showed the following relationships: (1) fertilizer demand was higher for farmers able to borrow from low-cost sources, while a lack of liquidity, the inability to borrow, or a high credit cost inhibited demand; (2) financial standing in relation to farm size and tenure also affected demand, but so did fertilizer prices (by lessening demand) and the increased growing of short-term modern varieties which increased demand; and (3) extension (demonstration plots) facilitated borrowing from formal sources which also increased fertilizer use. This study indicated that prices, fertilizer productivity due to modern crop varieties, and extension were found to be relatively more important than credit in accounting for variations in fertilizer consumption during this period. Estimates of credit significance in 1974 were difficult to interpret because of the tighter linkage of extension and subsidies to credit and fertilizer price. The authors concluded by noting the limitations of their study for price policy analysis. A bibliography containing eight sources (1975–79) is included.

AID/ta-BMA-7 931116900

060 **PN-AAH-585**

AN ANNOTATED BIBLIOGRAPHY OF CHICKPEA DISEASES 1915-1976

Nene, Y.L.; Mengistu, A; Sinclair, J.B.; Royse, D.J.
International Crops Research Institute for the Semi-Arid Tropics (ICRISAT).
1978, 49 p.

In Information Bulletin No. 1

Chickpea (*Cicer arietinum*) is a native Asian plant species grown as a pulse crop throughout tropical and subtropical Asia, northern Africa, southern Europe, Central America, and the southern U.S. It is a major source of protein for millions of people, especially in developing countries in the Eastern Hemisphere. About 11 million hectares of chick peas are cultivated annually around the world, with subsistence farmers of semiarid India producing more than 75% of the crop. This bibliography endeavors to provide a complete working file of the literature concerned with chickpea diseases and to assist in the identification of fungal and bacterial microorganisms associated with chickpea seeds. It is intended especially for scientists in the developing world who do not have ready access to large and well-stocked scientific libraries. The bibliography contains 331 citations, and is based on a literature search (1915–76) that ended with the December 1976 issues of *Biological Abstracts, Phytopathology, Plant Disease Reporter*, and *Review of Plant Pathology*, and the December 1975 issue of *Indian Phytopathology*. In order to gather as much information as possible, papers from conferences, and symposia have been included. Each citation is accompanied by either an abstract or annotation prepared by the original author or derived from *Biological Abstracts* and *Review of Plant Pathology* (*Review of Applied Mycology*). Most papers are printed in English. Foreign language publications include French, Spanish, German, Russian, Spanish, Hindi, Italian, Farsi, Portuguese, Turkish, Hebrew, Japanese, and Romanian, with the language of the publication, excluding English, indicated after the title. Concluding the bibliography is an index divided into five sections according to the causal agent of the disease: fungi, bacteria, viruses, nematodes, and phanerogamic parasite. Additional indices deal with seed-borne diseases, chemical control, and miscellaneous topics.

AID/ta-G-1499 931097200

061 **PN-AAH-586**

PROCEEDINGS OF THE INTERNATIONAL WORKSHOP ON THE CASSAVA MEALYBUG "PHENACOCCUS MANIHOTI" MAT-FERR. ("PSEUDOCOCCIDAE"), ZAIRE, 1977

International Institute of Tropical Agriculture (IITA).
1978, 90 p.

The International Institute of Tropical Agriculture (IITA), Nigeria, and the Department of Agriculture, Zaire, cosponsored an international workshop on the Cassava Mealybug, *Phenacoccus Manihoti* Mat-Ferr (*Pseudococcidae*) in Zaire, June 26–29, 1977. This report of the workshop proceedings includes an opening paper and eight technical papers, each accompanied by references. The opening paper addresses IITA's role in tropical agriculture, with special emphasis on the Zaire program. The technical papers concern observations, biology, taxonomy, ecology, and pest management of the cassava mealybug, and its incidence in the People's Republic of Congo, as well as on manioc (*Manihot esculenta*) in Bas-Zaire. A summary of workshop discussions and recommendations are included. These cover the origin and distribution of the mealybug; its development; the damage it inflicts; ways of controlling it culturally, chemically, and biologically; and hostplant resistance. In Africa, the cassava mealybug is of the American type and was probably introduced by the transfer of vegetative

manioc materials. *Phenacoccus gossypii* has been reported in Brazil and Colombia. There may be similarities between the feeding activity of the sugarcane and the cassava mealybug. It is suspected, however, that the appearance of short internodes, cell enlargement, and distortion in cassava may be due to the introduction of a toxin or growth inhibitor. Comparisons of infested and mealybug-free plants show no yield differences, but there are varietal differences depending on the nature of leafsheets. Comparisons of insecticide-treated and untreated plots show no yield differences. In searching for resistance, differences among genotypes must be assumed. Research on biological control of the mealybug should include a search for and evaluation of natural enemies in the mealybug's country of origin, and introduction of promising species into the subject country. Recommended control strategies include cultural, chemical, and quarantine pest management programs and research emphasizing breeding for hostplant resistance and biological control. A list of workshop participants is included.

AID/ta-G-1491 931030900

062 **PN-AAG-785**

THE POTENTIAL FOR REGIONAL COOPERATION IN FERTILIZER: A METHODOLOGY STUDY

Foster, T.H.; Livingston, O.W.; Stangel, P.J.
International Fertilizer Development Center (IFDC).
1976, 56 p.

In Technical Bulletin IFDC-T-2

Due to world fertilizer market instability and the importance of fertilizer as a strategic policy tool, the members of the Association of Southeast Asian Nations (ASEAN), composed of Indonesia, Malaysia, the Philippines, Singapore, and Thailand, plan to devise a policy to develop adequate, dependable, low-cost fertilizer supply alternatives. Under consideration is an expanded fertilizer production policy utilizing the concepts of economic cooperation and regional integration. The present document, a joint product of the International Fertilizer Development Center (IFDC) and IBRD, provides a preliminary methodological study of the potential benefits of this policy. The study used a mathematical programming model to determine the investment, production, importation, and transportation patterns that minimize the costs of meeting ASEAN's 1985 fertilizer requirements. This included the selection of plant sites and sizes, feed stocks, product mix, and transportation patterns most appropriate for varying degrees of economic cooperation. Results indicate that although the region's fertilizer production capacity is not expected to meet 1985 regional requirements, regional cooperation would lead to substantial economic benefit for all ASEAN members. Urea and monoammonium phosphate comprise the region's optimal product mix. The advantage of Indonesia in ammonia and urea production and of the Philippines in phosphate production will dominate regional industry adjustments to the anticipated 1985 supply/demand situation. An expanded analysis is recommended to determine the optimal timing of investment between 1978 and 1985 for a larger number of regional economic integration and trade relationships. Additional recommendations include studies of parameterization, alternative transportation and distribution systems, carnallite deposits, and constraints to regional cooperation. A 13-item bibliography (1974–75) and illustrative statistical tables are appended.

AID/ta-G-1218 GTS 931005400

063 **PN-AAH-317**

ADMINISTRATIVE REFORM IN PORTUGAL: AN ASSESSMENT OF THE CRISIS IN PUBLIC MANAGEMENT WITH RECOMMENDATIONS FOR ACTION

Macy, J.; Gallas, N.; Hobgood, H.; Post, A.; Sherwood, F.
United States Agency for International Development, Development Support Bureau, Office of Rural Development.
1979, 151 p.

That the financial management of the Portuguese Government requires immediate and serious attention is the crux of this report prepared by five senior U.S. public administrative consultants. The consultants report that Government estimates of revenue are frequently incorrect, resulting in too high expenditures and large deficits. Budgets are formulated without regard to the goods and services they are to accomplish. Six basic actions are recommended: (1) strengthen the management capacity of the Office of the Prime Minister; (2) improve all aspects of financial management from the planning of investments and budgeting of expenditures through the auditing of accounts and evaluation of performance; (3) reallocate authority to regional, district, and local authorities for more expeditious decisionmaking and delivery of services; (4) give special attention to the agriculture and rural development sector; (5) accelerate the preparation of all necessary policy, organizational, and procedural changes to effect administrative reforms in manpower planning, personnel administration, and labor management relations; and (6) mobilize existing resources and design new institutions for the training of managers at all levels. This report consists of an overview report, followed by five supporting papers on financial management; decentralization, deconcentration, and devolution; rural development; personnel policies, manpower development and management training; and public enterprise management.

DS/RAD 1500001

064 **PN-AAH-318**

GOVERNMENT AND ADMINISTRATION IN THE YEMEN ARAB REPUBLIC

Gable, R.W.
United States Agency for International Development, Development Support Bureau, Office of Rural Development.
1979, 167 p.

Prior to the revolution of 1962, the administration of Yemen was a living fossil — a patrimonial system of theocratic and highly personal rule by an Iman, with virtually unlimited power. Yemen lacked not only a civil service system, but public services as well. The government now employs more than 30,000 persons, and the number is rapidly growing. While the system is not based on merit, neither does it seem to encourage some of the more outrageous abuses of patronage. The most serious problem is an overall lack of experience, education, and training among the civil servants. This report, intended as a "primer" on public administration in the Yemen Arab Republic, is based on a visit to the capital city of Sana, November 27 to December 14, 1974. Over 40 persons employed by, or knowledgeable about, the Yemeni Government were interviewed. A substantial history and cultural review is provided in the report, covering the revolution of 1962, and political and administrative developments since that time. The structure of government, traditional sources of revenue, religious rivalries, and traditional legal systems are outlined. In addition, the author examines the pro's and con's of top-down and bottom-up development strategies, and concludes that neither alone is likely to be effective. The following actions are recommended: (1) develop the institutional capacity to stimulate, assist, and sustain rural development; (2) develop the institutional capacity to train administrators and managers; (3) assist selected ministries to deliver services to rural dwellers; and (4) improve the capacity of the central government to collect and allocate available resources (both foreign and domestic) so that the above activities can take place. A brief bibliography is included in the report (19 entries, 1915–79).

DS/RAD

065 **PN-AAH-493**

EXPATRIATE PROFESSIONALS AS INTERNATIONAL CONSULTANTS

Stepanek, J.E.; Ivory, M.
United States Agency for International Development, Technical Assistance Bureau, Office of Science and Technology.
1979, 72 p.

The permanent migration of professionals from LDCs is a problem of growing concern to countries worldwide as it creates a deficit of intellectual leadership in the LDCs. This "brain drain" can also occur when the educated are attracted to urban centers from rural areas within their own country. This report reviews the major findings of recent literature on the problem and recommends a means of returning expatriate professionals residing in the U.S. to their native country as short-term volunteer consultants. The financial loss to LDCs through education investment in professionals who migrate is substantial and their loss in terms of managerial, entrepreneurial and decisionmaking skills is even greater. Of all the expatriate professionals now living in developed countries, about half (250,000) live in the U.S. These include engineers, technologists, natural scientists, and others who could contribute to economic growth in their native countries. On the basis of results of an experimental program between the Government of Turkey and the U.N. Development program, this report recommends an action program through which expatriates residing in the U.S. would be encouraged and assisted in transferring technology appropriate to the needs of their home countries. Besides being a practical approach to the brain drain problem, such a program would support employment-creating projects for the poor majority and provide a cost-effective substitute for traditional technical assistance. Under this program, LDCs would receive a package of benefits, including repeat visits, continuing services from the U.S., and the chance that expatriates will return permanently. For initial implementation of the program, it is recommended that: (1) autonomous organizations be established in participating LDCs with links to government, business, and others seeking volunteer

services; (2) a cooperating U.S. private organization be identified and that this organization be formed between International Executive Service Corps and Volunteers in Technical Assistance; (3) four LDCs be invited to participate initially; and (4) expatriate associations in the U.S. be encouraged to participate. This report includes a 12-item bibliography (1966–78) and four appendices.

TA/OST

066 **PN-AAH-502**

GUIDELINES FOR AID'S REGIONAL ACTIVITIES IN AFRICA

Belcher, M.S.
1980, 72 p.

All A.I.D. regional projects should be consistent with one or more of the following principles: (1) cooperation among two or more countries is essential to success; (2) the project strengthens and increases inter-country cooperation; (3) a regional project is more efficient for administrative purposes; (4) project activities are experimental and promote exchange of experience; and 5) it is more convenient to group a series of small country activities under a single "umbrella" project. These are some of the main findings of a study to develop a strategy for A.I.D.'s African regional development (AFR/RA) program. The author notes, however, that many of the present umbrella projects neglect opportunities for exchange of experience and also that, despite excellent opportunities, food and agriculture projects account for only about 12% of A.I.D.'s total regional efforts. It is recommended that A.I.D. support to African regional organizations be based on the degree of genuine African support, the extent of real regional activity, effectiveness, receptivity to A.I.D. assistance and cooperation, concern for basic human needs, cooperation with other organizations, and support by other donors. Nine principal types of activity are found appropriate for regional projects. These include participant and in-country training, student and faculty exchanges, attacks on pests and diseases, cooperative research, middle level technical training, distance learning, documentation collection and dissemination, and experimental approaches to common problems. Especially recommended areas of research are family planning; common tropical disease problems; common ecologically-based problems of crops, cattle, and soils; land tenure and use; and the effective use of mass-media for education. Technical training in repair and maintenance for transportation and communications activities is urged, and planners are admonished not to ignore urbanization and increasing underemployment and unemployment. The paper concludes by reviewing the AFR/RA program in various functional areas against these guidelines and assessing future development needs which might be met on a regional basis. Various appendices and a 45-item bibliography (1970–80) are included.

A!D/afr-C-1554 698013500

067 **PN-AAH-598**

EAST AND SOUTHEAST ASIA: A BIBLIOGRAPHY

University of Wisconsin, Land Tenure Center (LTC).
1979, 122 p.

In LTC Training and Methods Series, No. 14, Suppl. 2

As materials dealing with East Asia are extensive in the Land Tenure Center Library at the University of Wisconsin, a bibliography has been compiled listing those references. This present document is a supplement to that bibliography. Approximately 1,500 citations (1954–78) are entered for Asia, Central Asia, East Asia, China, Hong Kong, Japan, Korea, People's Republic of Korea, Republic of Korea, Macao, and Taiwan. Common subject headings listed under Asia, China, Hong Kong, Japan, Republic of Korea, and Taiwan include agriculture, economy, labor and employment, and land tenure and reform. Subject headings listed for Central Asia (Mongolia, Russian Central Asia, and Tibet) pertain generally to economies, industrial development, and social change. References for Korea deal with its political division, agricultural development, and land systems, ownership, and distribution. Other subject headings include communes and collectives; foreign aid and relations; industry and labor; politics and government; population and family planning; science and technology; social conditions; trade; women; technological change; food and foodgrains; reclamation; rural and community development; cities and towns; cooperatives; and credit, finance and taxation. With the occasional exception of documents written in the French, German, and Spanish languages, the references are published in English.

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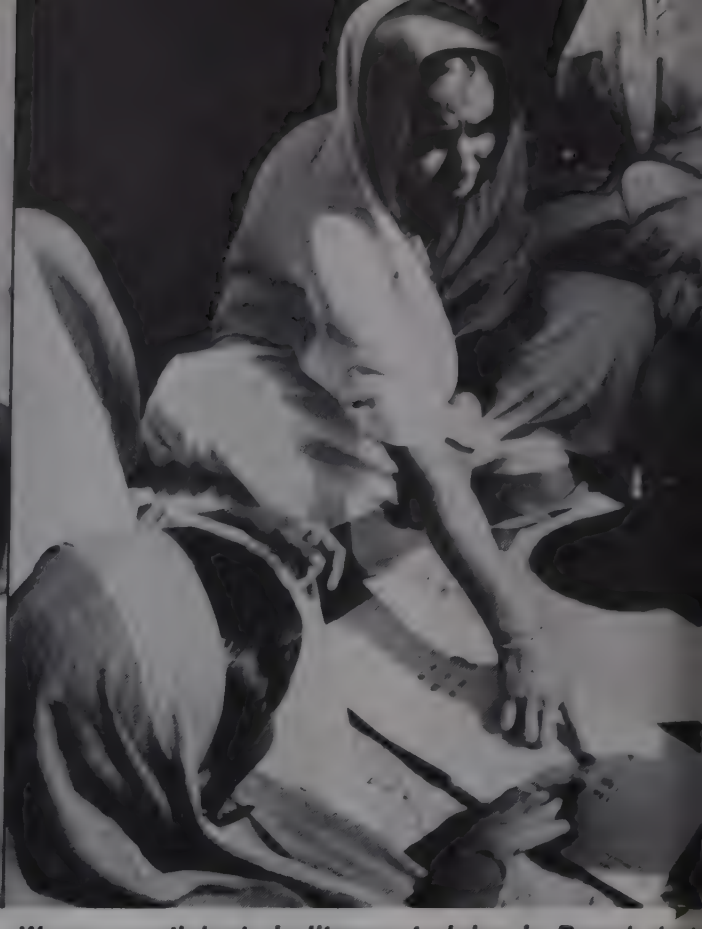
068 **PN-AAH-143**

STATUS OF WOMEN, SRI LANKA

Colombo University, Sri Lanka.

Constitutional rights, coeducation, and other advances have not yet dispelled the low cultural value assigned to women in Sri Lanka and other South/Southeast Asian countries. This report, initiated by a group of women from Colombo University, consists of eight studies profiling the status of women in terms of sociocultural factors, demographics, law, creative arts and the mass media, education, economics, political participation and decisionmaking, and health and nutrition. It is based on national-level surveys and official statistics, supplemented by field studies. The field studies were carried out in three rural areas representative of the nation's major ethnic groups (the Sinhala, Tamil, and Muslims) and in a mixed-population urban area. The studies highlight discriminatory practices and attitudes that bedevil the progress of women in Sri Lanka. One survey showed a majority of employers (78.6%) endorsing both sex-based job differentiation and male preference in job recruitment (60.7%). Although greater numbers of women are seeking higher education, patterns of enrollment reflect cultural attitudes which favor the teaching and medical professions for women and reserve technology as a male field. Such sex disparities are even greater in vocational education programs. In addition, stereotyped images of women as portrayed in popular nov-

A woman physician examines a young patient in Calcutta.



Women participate in literacy training in Bangladesh

els, films, and advertising (i.e., as weak and passive or dangerously seductive) are documented and discussed. As a result of these studies, recommendations were formulated to serve as the basis for a much-needed national plan to improve the status of women. Among the actions recommended are: (1) the introduction of legislation to bring personal law in line with general law in those areas in which women suffer disabilities — for example, divorce under Muslim law and women's rights to contract and dispose of property under Thesawalamai law; (2) sponsorship of consciousness-raising programs to help question the legitimacy of present cultural and ideological beliefs pertaining to women; and (3) removal of regulations and administrative practices that conflict with the principle of equal employment opportunities for women. Bibliographies follow each section of the report.

PPC/WID

069 **PN-AAH-309**

INTEGRATING WOMEN INTO NATIONAL ECONOMIES: PROGRAMMING CONSIDERATIONS WITH SPECIAL REFERENCE TO THE NEAR EAST

Van Dusen, R.A.
1977, 72 p.

Although literature on women's role in development goes back at least a decade, it is still a fugitive literature, with more than half not published except in-house. This document presents an overview of the literature and issues pertaining to women in development, particularly in the Islamic Near East. Regarding that region more than any other, it is the feeling of development personnel that virtually nothing is known about women's roles, and that little can be done to bring women into the economic mainstream. Four major hypotheses or assumptions regarding women in development are examined in this report: (1) that the literature on women in development is not policy-oriented; (2) that the obstacles to reaching women are almost insurmountable; (3) that little is known about Near Eastern women, and that is the way the Near Eastern governments want it; and (4) that women in the Near East do not work and do not want to work. The author suggests four types of projects for women which are most likely to succeed — income-producing activities (rural industries, handicrafts, cooperatives, etc.), projects which bolster the organization and programs of local women and their communities, those related to the upbringing of children, and projects that enhance the competence or desirability of wives and homemakers. The significance behind these projects is that they are based upon accepted roles for women. Two bibliographies are provided, an annotated bibliography covering women in development in general (77 entries, 1964–77), and a bibliography of materials on women in the Near East (141 entries, 1970–76). The second bibliography is not annotated and lists 25 titles in French.

AID/ne-147-77-2 298003500

070 **PN-AAH-331**

WOMEN IN RURAL DEVELOPMENT: A BIBLIOGRAPHY

Phillips, B.
University of Wisconsin, Land Tenure Center (LTC).
1979, 48 p.

In LTC Training and Methods Series, No. 29

What are the roles currently played by women in rural development? The present bibliography provides a wide range of source materials to answer this question. A first section consists of entries relating to the developing world in general. Later sections are grouped by region and include Africa, Asia, Europe, Latin America, the Near East, and the United States. Most of these materials were published in the 1970's. A large number of Spanish, and some French titles, appear. Unfortunately, no introduction detailing the origin of the bibliography or its usefulness is provided.

AID/csd-2263 211(d) 931011100

Women labor in a rice paddy in Sri Lanka.

071 **PN-AAH-437**

A STUDY ON THE STATUS OF KOREAN WOMEN IN NATIONAL DEVELOPMENT

Kim, O.Y.; Lee, K.
Sookmyung Women's University.
1977, 88 p.

Since the advent of the women's liberation movement in the United States and Europe in the 1960s, and the U.N. proclamation of 1975 as International Women's Year, several studies concerning the status of women in Korea have been conducted. These studies, however, have failed to examine the role of Korean women in national development and the degree to which they participate in the decisionmaking process. This study examines both of these issues, and is therefore both innovative and valuable. An introductory chapter provides a brief literature review on the historical, political, legal, educational, and socioeconomic status of Korean women, and the research methodology of the present study. Several variables are examined: age, education, duration of marriage, onomic status, consciousness of discrimination and women's status, and residence. A random sample of 866 Korean women from Seoul and six rural areas was drawn to test the hypothesis that Korean women will perform more effective roles in national development as they become more involved in decisionmaking. Chapter two presents the study's theoretical framework by reviewing the improvement of women's status in light of feminist ideologies, changing sex roles, and the economic contribution of working women; and defines the concepts of status, power, authority, and role. Chapter three examines demographic, educational, and socioeconomic indicators of women's status, postulating that as womens' age, education, marital longevity, urban proximity, economic status, and consciousness of their status and of discrimination increase, so does their participation and power in the decision making process. In the final chapters, the above postulations are verified, thus confirming the study's central hypothesis regarding women's potential role in national development. Further research is suggested with additional indicators of religion, occupation, and family system. A study comparing this project's findings with the findings of similar projects in other countries, as well as a study of Korean men's views toward women's status, are also recommended. Footnotes and a 50-item bibliography (1956–77) are appended.

AID-498-WID-3-T 489024900

072 **PN-AAH-579**

WOMEN IN A DEVELOPING ECONOMY: A WEST AFRICAN CASE STUDY

Spencer, D.S.C.
Michigan State University, Department of Agricultural Economics.
1979, 69 p.

The role women play in the economic development process and the benefits they derive therefrom are of concern to donor agencies and policymakers. This monograph presents a case study of the role of women in the rural economy of Sierra Leone. A series of detailed surveys were conducted of both farm and non-farm households in Sierra Leone; these included sampling and recording of farm-level activities, migration patterns, fishing, small-scale industry, and the role of women in household decisionmaking. Households were visited twice a week for at least 12 months. Detailed analyses of these surveys resulted in general conclusions. Women play an important role in agriculture and contribute at least 40% of the total labor input. Agricultural development projects which stress mechanization tend to have an adverse affect on the female work load as they increase the amount of land available for planting, weeding and harvesting which are the woman's primary functions in agriculture. It has been found that women play a small role in small-scale industrial activities in both rural and urban areas with the exception of the gara industry which is dominated by women. The survey indicated that, on the whole, wage rates are lower for women than for men in both rural and urban areas. It was also found that women play a minor role in agricultural decisionmaking, but an important role in household decisionmaking as well as in decisions relating to the borrowing of money. Finally, it was discovered that women share equally in the proceeds of the sales of cash crops as well as in the profits derived from retail trade. This study indicates that while there is no need to develop special agricultural policies for women in Sierra Leone, government should ensure that profitable female-dominated activities are encouraged. Also, help in the form of extension advice

is needed to raise incomes in the low-income, female-dominated activities. The government should ensure that its tariff and macro-economic policies do not discriminate against female-dominated enterprises. A 30-item bibliography (1952–79) and survey forms are appended.

AID/afr-C-1364 931000100

073 PN-AAH-601

SOCIAL CHANGE AND RURAL WOMEN: POSSIBILITIES OF PARTICIPATION

Adnan, S.; Islam, R.
University of Wisconsin, Land Tenure Center (LTC).
1979, 21 p.

In LTC Reprint No. 137; prepared for a seminar on The Role of Women in Socioeconomic Development in Bangladesh

The women of rural Bangladesh live in a world of both real and symbolic seclusion: they are second-class citizens because of political, economic, social, and legal bondage. The rural culture is male dominated to an extreme degree. Polygamy, seclusion (purdah), universal distrust of feminine emancipation, and flouting of the Family Law Ordinance are practiced. This report discusses the role of women in rural Bangladesh and suggests methods of improving their situation. The status and emancipation of women rests on their relation to the means of production and their consequent roles in production organization, including that of the family-based production unit which is present in the rural economy. Lack of organization and consciousness regarding these factors have kept women in a depressed status. The actual and potential contribution of women to the rural economy is staggering. Most of the women spend their productive time working in the home and caring for their children, or performing menial tasks such as fetching water and dehusking rice. If some of this time could be saved through the advent of simple technologies such as communal running water and use of dehusking machines, much of the women's time could be spent in productive work outside the home. Day care centers, which would be needed in such an eventuality, could easily be provided. Women also need to be educated to carry out some degree of production outside the home. While potential levels of available skilled female labor are high, this potential is not, in reality, very encouraging given the high overall unemployment rate in Bangladesh's villages. A possible solution is the development of policies to promote industrial labor by men so that women could engage in those agricultural activities for which they are as capable as men. However, before attempting to change the status of women in Bangladesh, planners must constantly remind themselves that there are extremely conservative social and religious forces in these villages which will strive to undermine any change in the social status of women. A bibliography of 19 references (1974–76) is appended.

AID/csd-2263 211(d) 931011100

074 PN-AAH-603

ZINACANTECO WOMEN: PREDICTION FOR CHANGE IN A MEXICAN VILLAGE

Hogan, J.; Tienda, M.
University of Wisconsin, Land Tenure Center (LTC).
1979, 23 p.

In LTC Paper No. 120

Recent studies on the changing roles of women have focused on the impact of modernization upon their traditional activity. This case study argues the thesis that the ability of the Zinacantecos (Mexican Indians) to mitigate the potentially destabilizing forces of modernization rests to some extent on how their women, who have been secluded from these forces, manage to maintain their traditional life-style. The old social and institutional arrangements that inhibit women's activity are considered first. The authors then suggest how the ecological imbalances stemming from population growth might undermine the ability of the Zinacantecos to maintain traditional cultural and ethnic identity. For the Zinacantecos, land use defines the social organization. Due to the narrow resource base available from their own farmlands, Zinacanteco men must move into lowland farming and wage labor, which increases their contact with the Mexican ladino culture and the need for Spanish language skills. This increases individual wealth and can alter traditional living arrangements after marriage, as well as the ceremonial foundation of Zinacantan society, the wealth-based cargo system. Presently, the cargo system is becoming overloaded by excessive applications. Women, on the other hand, are confined to domestic duties and are buffered from external influences by their husbands. The home is the bastion of ethnic identity and women remain the guardians of that identity. Their roles are dictated by Zinacantan institutions and ritualized life style. Increasing contact with the ladino environment, however, may begin to force women to go outside the home, attend school, learn Spanish, adopt ladino dress, and participate in activities formerly reserved to men. This would require a redefinition of the traditional social image of women. In the long run, such a strategy may be preferable to that of maintaining the old culture by isolating women into their traditional roles. Indeed, the stress placed on the system by increasing population growth may make maintenance of the old culture self-defeating. A bibliography of 15 English sources (1965–77) is included.

AID/csd-2263 211(d) 931011100

075 **PN-AAG-784**

THE USE OF ECONOMIC MODELS IN EVALUATING THE IMPACT OF RURAL DEVELOPMENT AND INCOME REDISTRIBUTION PROGRAMS IN THE LDC'S

Applegate, M.J.
1975, 86 p.

In Faculty Working Paper No. 38

Whether rural development results in a redistribution of income in favor of the poor is an unresolved question in the development literature. This study approaches this question by analyzing the use of existing economic models to evaluate the impact of rural development and allied income redistribution programs in LDCs. In part one, two-sector models of economic dualism are discussed in regard to their implications for improving income distribution between agricultural and nonagricultural sectors and for agricultural development policy. These models, and especially that of Mellor-Lele, imply that as technology stimulates agricultural growth and the increased agricultural output that results is consumed by agricultural labor, there will occur a decrease in marketble surplus which decreases employment opportunities in the nonagricultural sector. What is needed, therefore, is a balanced-growth strategy emphasizing both agricultural development through technology and investment in the nonagricultural sector. In part two, the use of quantitative techniques to measure the effects of changes in the size distribution of income is examined. The total impact as reflected by the savings and demand effects on relative factor intensities due to changes in the composition of demand are discussed. The author recommends that migration to the urban sector can improve the marginal productivity of labor, so industrialization should be encouraged. To prevent an income gap between rural and urban areas from occurring, an agricultural development program should also be implemented. In part three, some recent attempts to measure the effects of technology and of various inputs, such as credit and technical assistance, are analyzed. Increased technological inputs increase farmer options in selecting low-cost production methods. The final section presents a dynamic multisectoral model of Guatemala used for measuring the effects both of technological change in the traditional agricultural sector and of a proposed land reform program. A bibliography containing 40 titles (1954–74) in both English and Spanish is also included.

AID/ta-BMA-2 931113402

076 **PN-AAG-787**

FERTILIZER MIXING PLANT FEASIBILITY STUDY

Frederick, M.T.; Smith, R.T.
1978, 94 p.

In August 1978, USAID/Bolivia requested that the International Fertilizer Development Center (IFDC) prepare a feasibility study for a fertilizer mixing plant in Bolivia. Emphasis was to be placed on an analysis of existing and potential fertilizer demand among small farmers. This document presents that study. After an overview of the Bolivian climate, soil, and crop production, current exploitation of Bolivia's major fertilizer raw materials is described. Next, the nation's infrastructure and its influence upon the farming sector are outlined, followed by a discussion of the present lack of an indigenous fertilizer industry and of future fertilizer manufacturing plans. Succeeding sections treat community development programs, extension services, current fertilizer patterns and consumption, the lack of soil testing facilities, the marketing and distribution of fertilizer, and the economic returns resulting from fertilizer. The IFDC draws several conclusions from their findings. The Bolivian campesino is well informed in the use and economic benefits of fertilizers. The potato growers in altiplano and Cochabamba are particularly sophisticated in their approach to crop fertilization. High fertilizer prices can be attributed to the pricing policies of the dealers, the imbalance of supply and demand, the lack of integrated government fertilizer programs and of importation controls on dealers, and the absence of preferential treatment for fertilizer imports. The resulting high prices and unavailability of fertilizer has inhibited demand. Costs can be decreased by employing money-saving business tactics and negotiation methods when importing fertilizer. An integrated agricultural program through a central agency would also be beneficial. The IFDC recommends a 6-phase program which moves from the importation of bagged fertilizers into a mixed system of bulk handling, blending, and bagging with future incorporation of indigenously produced fertilizers. Within this system, good business practices are essential. Tables and maps are presented throughout this document. A bibliography of 52 English and Spanish sources (1967–78) is included.

AID-511-165T

077 **PN-AAG-997**

REPORT ON POTENTIAL COLLABORATIVE INDUSTRIAL ENTERPRISES IN THE NEAR EAST REGION

Nathan Associates, Inc.
1979, 94 p.

Preservation of peaceful coexistence in the Near East may depend largely on the development of economic and financial ties between public and private business entities in Israel and its neighbors. In this connection, the present paper studies the potential of, and determines criteria for, collaborative industrial enterprises (CIEs) in the region. An overview of the status of industry in the Near East, focusing on unutilized or underutilized resources, marketing capabilities, and the potential effect of additional capital inputs, is first presented, followed by detailed accounts of industry in the economies of Egypt, Israel, Gaza, the West Bank, Jordan, Syria, and Lebanon. This review leads to the conclusion that considerable economic benefit could accrue to participants in CIEs. The nature and possibility of CIEs between these countries is then discussed and certain possibilities identified. Since the governments of the region control the ownership and operation of large construction and manufacturing enterprises, the possibilities for joint ownership and management would seem more likely for small- to medium-sized firms in the private sector. Despite constraints due to inadequate infrastructure, shortage of investment funds, limited natural resources, and competition from foreign markets, CIEs can be successful in the region if: (1) enter-

prises are carefully selected for availability of complementary inputs and products of high value and export potential; (2) supporting institutions, such as industrial parks in free trade zones near borders and special financial agencies to provide investment funds, are established in advance; (3) third parties participate, particularly in providing investment capital, as well as technical and other assistance; (4) governments of participating countries provide investment incentives and expedite necessary processes; (5) adequate infrastructure, such as communication and transportation facilities, and, even more importantly, skilled and experienced management, are available. A list of the most promising industrial subsectors for potential CIE's is included.

AID/afr-C-1134 GTS

078 **PN-AAH-310**

COOPERATIVES, INITIATIVE, PARTICIPATION AND SOCIO-ECONOMIC CHANGE IN THE SAHEL

Derman, B.
Michigan State University, Department of Agricultural Economics.
1978, 77 p.

Are the Sahelian peasants and herders, who have resisted change and refused to become market-oriented, irrational? Some theorists of development have reached that conclusion. Others take the viewpoint that there are a variety of paths to development, and that one should expect to find greater variability in the responses of rural peoples. The author of this report aligns himself with the latter viewpoint, emphasizing that the Sahel has never been an unchanging area. In fact, indigenous initiative is just as characteristic of the Sahel as stability and tradition. Examples include the introduction of new products such as the kola nut into the Central Sudan by the Wangara merchants, the spread of pastoralism, and the development of gardens by West Africans to meet the demand of Europeans for a variety of vegetables. In addition, the report focuses on the role of cooperatives and the degree of local participation generated by them. Experiences in Senegal, Mali, and Niger are related through quotations from a number of studies. The author concludes that cooperatives have not promoted the goal of increased equality and participation of the poor — instead, the hold of existing political and economic structures upon the poor has been intensified. The report includes footnotes and a bibliography (129 entries, 1952–78).

AID/afr-C-1260 625092600

079 **PN-AAH-347**

A REVIEW OF EMPIRICAL STUDIES OF DEMAND FOR AGRICULTURAL LOANS

David, C.C.; Meyer, R.L.
Ohio State University, Department of Agricultural Economics and Rural Sociology.
1979, 38 p.

Prepared for the Second International Conference on Rural Finance Research Issues, Paper No. 2

Loan demand within LDCs is a growing economic activity and therefore merits greater understanding. This document is a review of recent loan demand studies from two perspectives: those concerned with loan demand projections; and those that quantify loan relationships. In part one of the review, a conceptual model is used to identify the commonly used factors which affect loan demand. Borrowing costs, investment options, and time consumption preferences are identified as the principle factors affecting farm-household demand. Technical improvements, high farm prices, greater factor endowments, and investment opportunities generally raise demand. Prices and technical changes which raise input levels or improve resource utilization will lower demand because they can be financed from increased savings. The authors contend that loan demand in LDCs should be based upon an interdependent production and consumption model. Farm production borrowing is the difference between desired investment levels and savings, while household consumption borrowing is the difference between present income and desired consumption. Savings are linked to income levels and investment options. In part two, loan projection studies are reviewed. In most LDCs, projections consist of calculating average production costs and then subtracting self-financing estimates and external funding. These proportions are judgemental and estimates are usually inconsistent with actual borrowing figures. Another method utilizes investments and historical capital inflows, yet most LDCs lack the required data for this kind of approach. Furthermore, this model is inappropriate for use in rapidly developing countries. It is recommended that structural relationships be clarified and that data on loan supply and demand functions be collected for improving these studies. Part three reviews economic and mathematical programming studies which determine loan demand relationships. Econometric studies use loan demand functions and derive demand elasticities from estimated profit functions to clarify these relationships. Mathematical programming studies analyze optimum enterprise mix, resource use, and farm income under simulated conditions. Only a few studies regarding LDCs have been done in this field. Forty-three bibliographic items (1966–78) are included.

AID/ta-BMA-7 931116900

080 **PN-AAH-350**

BARRIERS TO FINANCIAL REFORM

Vogel, R.C.
Ohio State University, Department of Agricultural Economics and Rural Sociology.
1979, 31 p.

Prepared for the Second International Conference on Rural Finance Research Issues, Paper, No. 5

Despite widespread agreement that rural financial reforms are needed in LDCs, arguments against the possibility of implementing such reforms are often heard. Four common arguments, all illustrative of existing barriers to financial reform, are analyzed here. One argument contends that reform would bankrupt many financial institutions. Raising interest rates to competitive market levels, particularly in LDCs experiencing rapid inflation, would force these institutions to pay higher short-term rates on deposits. Since rates on long-term loans could not be altered until after they mature, institutions would be caught in a financial crisis. The optimal control theory, which places ceilings upon loan and deposit rates and on monetary expansion, could be used to eliminate this problem, but is considered too complex to operate within LDCs. Raising rates on outstanding long-term loans is the best option, but its legality is questionable. This first argument is not considered strong because most institutions do not have their assets in long-term commitments. A second and better argument asserts that preferential loan rates for farmers are needed to compensate for other market distortions, such as low food prices and tariff barriers. But this viewpoint is weak also, because loans of this nature have concentrated on assisting wealthy farmers and not the majority of small farmers who need it. Also, the technical and infrastructural changes required to improve farming standards will not be influenced by these loan benefits. A third argument is that stabilization programs would be hurt over the short term by higher interest rates. Inflation could be reduced, but different sectors of production would be constrained. Both this argument and the final one, which considers the linkage between financial reforms and international economic policies, are stronger than those that precede and therefore need further investigation. The final argument is especially complex, since raising rates stimulates capital inflows which runs counter to economic objectives by raising the exchange rate and altering the balance of payments. A bibliography (1967–77) of nine English and Spanish sources is included.

AID/ta-BMA-7 931116900

081 **PN-AAH-352**

FINANCING THE BEGINNING FARMER: TOWARDS MORE REALISTIC FARM PURCHASE LOAN REPAYMENT ARRANGEMENTS

McClatchy, D.
Ohio State University, Department of Agricultural Economics and Rural Sociology.
1979, 42 p.

Prepared for the Second International Conference on Rural Finance Research Issues, Paper No. 7

Increasing capital requirements are causing a financial entry problem for beginning farmers purchasing land. This paper suggests a solution to this problem by identifying the underlying reason for it. Two sides to the financial problem facing young farmers are distinguished. There is the structural side, namely the continuing increase in the capital value of farms in real dollar terms. Attempts by financial institutions to solve this part of the problem by making more farm real estate mortgage credit available have met with meager response from farmers. The reason for this, in the author's view, is that nothing has been done about the other, institutional, side of the problem: the general requirement that farm mortgage loans be serviced by annual or even more frequent payments so that the loan can be fully retired within 20-30 years, in short, by the time farmers are ready to retire. Thus, farmers can borrow only what they can repay within a farming lifetime. The author considers this difficulty one of timing; specifically, an inconsistency between the timing of the economic returns to the farm purchase investment through capital gains and the annual net rental income, and the required schedule for repaying the mortgage credit available to finance this investment. In short, loan repayments eat up capital gains. A review of empirical evidence over the last two decades suggests that the timing of capital gains makes such gains totally unsuitable for servicing conventional farm real estate mortgage loans. Thus, the average farmer is only justified in borrowing more than half of the farm purchase price to the extent he is willing to contribute some of his normal labor and management return and other income towards servicing a larger loan. It is concluded that the most promising solution to the entry problem (without recourse to subsidies) lies in incorporating more flexibility into the terms and conditions of repaying farm mortgage loans. Several policy alternatives are noted, as is the need for research into their potential impacts and institutional drawbacks. Illustrative tables and charts, footnotes, a 26-item bibliography (1954–78), and two technical appendices are included.

AID/ta-BMA-7 931116900

082 **PN-AAH-353**

IDENTIFYING FUTURE FARM TRANSFER CREDIT REQUIREMENTS: A CANADIAN STUDY

Tung, F. Jones, W.D.
Ohio State University, Department of Agricultural Economics and Rural Sociology.
1979, 20 p.

Prepared for the Second International Conference on Rural Finance Research Issues, Paper No. 8

Canada's farming sector is becoming increasingly dependent on credit as a source of investment and operating capital. This paper projects 1981 credit requirements for the transfer of farm real estate and examines the implications of this projection for the agricultural sector. In the first of three sections, the components that determine farm transfer credit needs are discussed, followed in the second section by a description of the forecasting model used by the

authors. The third section presents the forecasted results derived from the model together with their implications. Transfer credit needs were determined by the number and size of transfers regarding both new and expanding farmers. These figures were then calculated along with the prices of real estate. Internal financing was subtracted from total funding transfer requirements to determine credit demand. The forecasting model is composed of three elements: transition probabilities, the number of possible entrants during the project period, and farm size. Forecasts indicate an increase of transfer capital and credit requirements of 4% over the 1976–81 period. Farm transfer estimates for the 1976–81 period shows a reduction of farmland expansion and an increase in new farm entrants. The authors suggest three possible implications of these projections. First, that a majority of Canadian farms are reaching their maximum viable size, given their present technological levels. Second, that a limited supply of real estate is available for current expansion needs. Finally, that alternative means of entering the farm industry, such as part-time farming, are attracting more individuals into the industry. Increases in capital and credit requirements indicate that new farmers will find it difficult to meet equity requirements for loans on farm land. Raising farm values will mean that new farmers will need increasing financial assistance. This may result in the formation of farm cooperatives or tenant farming. The cost of using capital will also increase, affecting the industry's market position and the need for government support. Two appendices containing data sources and statistics are also included.

AID/ta-BMA-7 931116900

083 **PN-AAH-354**

SECTORAL DEMAND FOR CREDIT AND CREDIT POLICY (CHILE)

Cuevas, C.C.
Ohio State University, Department of Agricultural Economics and Rural Sociology.
1979, 14 p.

Prepared for the Second International Conference on Rural Finance Research Issues, Paper No. 9

In Chile, the use of agricultural credit has not aided sectoral development. This document analyzes the causes of this problem by discussing the behavior of agricultural credit for the period 1965–77, with particular emphasis on the period 1974–77; and by comparing sector credit demand with credit supply and the gap between the two, as well as the form in which credit is supplied. In Chile, institutional credit supplied for operational and investment needs by commercial banks, specifically the Banco del Estado, has been the farmer's main source for loans. Since 1965, operational loans have averaged 80% of the total demand. Investment loans have been smaller, peaking at 25%. In 1976, operational credit was linked to the consumer price index and the real rates assessed to cover farming input costs and social security payments averaged 16% per annum. Wages and salaries had to be funded from the farmer's own resources or from regular banking facilities which commanded high interest rates. Even though investment credit rates are presently between 10-16%, this credit is seldom accessed by small farmers because of the heavy collateral guarantees that are required. For this reason, total farming investment has been low. Since 1974, farming protection has increased relative to other sectors, yet the profitability of the traditional farms is low and therefore must be funded from other sources. Traditional crops account for 80% of the cultivated land in Chile and profits are low. If resources were reallocated into cattle or fruit farming, rates of return would increase. Traditional farmers have not altered their methods because this would require an investment, with collateral requirements, that they could not obtain. Foreign competition and credit policies have deterred farmers from using credit, from purchasing farming inputs, and from pursuing labor-intensive activities. As a result, operational credit demand between 1976 and 1977 was 40% above actual borrowing. Foreign credit restrictions have been reduced, which will provide added funds and lower rates. Measures to provide state guarantees for farmers in need might enable more farmers to acquire loans.

AID/ta-BMA-7 931116900

084 **PN-AAH-355**

OPTIMAL FUNDING STRATEGIES FOR FINANCIAL COOPERATIVES

Tauer, L. Boehljie, M.
Ohio State University, Department of Agricultural Economics and Rural Sociology.
1979, 32 p.

Prepared for the Second International Conference on Rural Finance Research Issues, Paper No. 10

The cooperative Farm Credit System (FCS) was established with the purpose of improving the income and well-being of U.S. farmers and ranchers by providing a source of sound, adequate, and constructive credit. As a member of the FCS, a district Federal Intermediate Credit Bank (FICB) serves as the intermediary between national sources of money and local Production Credit Associations (PCAs) and other qualified financial institutions within that district. The objective of this study was to develop a liability management model to aid in the debt management decisions of a FICB. In this instance, the model was applied to the debt selection process faced by the Omaha, Nebraska FICB. The analysis was structured to determine the optimal borrowing activities that would minimize the expected cost of credit at various levels of cost variance. In addition, optimal (in terms of minimum cost at various levels of cost-risk) maturity distribution and time issuance of debt instruments were determined for a multiperiod planning horizon. A planning horizon of 3 years (1979–81) was chosen — permitting an analysis of the impact of sequential funding with discount notes, and 6- and 9-month bonds. Longer-term bonds would have required a substantially longer planning horizon. With the use of an inventory model, it was possible to estimate the optimal bond purchases for the selected time period given an estimate of probable demand, cost of bonds, cost inventory (funds) deficits, and return from excess inventory balances. Analysis revealed that extensive use of both long-term bonds and discount notes is called for. The 6- and 9-month bonds are very similar with

regard to expected costs, variance-covariance and duration. It therefore appears that they are good substitutes for each other, depending upon funding needs of the bank and relative costs. The authors conclude that this model is a useful day-to-day management aid in analyzing liability structures. A bibliography is included (17 entries, 1959–79).

AID/ta-BMA-7 931116900

085 PN-AAH-356

MOBILIZATION OF RURAL SAVINGS: THE CASE OF THE SUDANESE SAVINGS BANK

Auri, A. Mottura, P.
Ohio State University, Department of Agricultural Economics and Rural Sociology.
1979, 22 p.

Prepared for the Second International Conference on Rural Finance Research Issues, Paper No. 11

The Sudanese Savings Bank (SSB) was established in 1974 to promote Sudanese socioeconomic development. Various aspects of its institutional growth are discussed in this document. Overall SSB deposits have grown due to local government and Central Bank support, branch evening hours, trained and locally known staff, and rural location and lending policies. Deposit growth is seasonal, decreasing during July and August. Both savings and investments accounts provide benefits not available in commercial banks. Savings accounts have grown since 1975, due to an 8% rate of return, a low opening account requirement fee, a policy allowing unlimited withdrawals, and the savings box concept. These deposits have been attractive to middle- and upper-income savers, particularly in individual accounts. Time deposit 12-month investment accounts with a 9% interest rate are also offered, and while not as successful as anticipated, they are growing in popularity. Lack of success could be due to the psychology of local savers and the fact that the account only offers a 1% increase over normal deposits. Data on SSB current accounts, which are the same as offered elsewhere, are mixed. On the whole, it appears that the SSB is specializing as a savings deposit collector as intended. Innovations used by the SSB include night service, savings stamps, certificates of value, publicity programs, and the Mobil Unit Service (MU). The MU, which is discussed in some detail, has opened 12.3% of the total deposits and collected 0.27% of SSB's balances. This is below expectations. Further, MU attempts to increase investment and current accounts have not succeeded. Uncertainty surrounding the MU exists, because funds are frequently unavailable as compared with normal deposits. In conclusion, the SSB has done well during its initial period, encouraging customers with no previous banking experience to use its facilities. High MU costs are balanced by its research and promotional activities, noninterest bearing deposits are low, and liquidity requirements may inhibit an increase in loan-to-deposit ratio.

AID/ta-BMA-7 931116900

086 PN-AAH-357

THE FUNDING PROBLEM IN RURAL DEVELOPMENT BANKS WITH EMPIRICAL REFERENCE TO THE JAMAICA DEVELOPMENT BANK

Bourne, C.; Graham, D.H.
Ohio State University, Department of Agricultural Economics and Rural Sociology.
1979, 22 p.

Prepared for the Second International Conference of Rural Finance Research Issues, Paper No. 12

The funding problem confronting Rural Development Banks (RDBs) has been neglected by contemporary analysts. This document studies the funding of these banks with empirical reference to the Jamaican Development Bank (JDB), in order to explain their credit operations and to identify those factors that determine financial growth. This paper is divided into four sections. The first describes the main sources of RDB funding, while the second examines their short-term implications. The third section outlines bank inflows over the long-term, while the last examines three ways of relieving bank funding problems. RDBs are very dependent on local governments and external agencies such as the World Bank for their funding. Local private institutions and loan repayments to RDBs have not been significant. Between 1970 and 1977, the JDB, for example, received 23.6% of its funding from external sources and 52.4% from its own Government. The conditions imposed by these two main lending bodies are restrictive. Foreign restrictions include: (1) forbidding RDBs from conducting any working capital loans; (2) defining target groups for their loans; and (3) maintaining a preference for single crop, long gestation projects. These measures are biased towards large farmers and force other borrowers to rely upon internal financing over the short term, which decreases their liquidity. Interest rate policies which RDBs must repay and exchange rate exposure also jeopardize their efficiency. Government source loans are directed, on the other hand, towards small farmers and require concessional interest rates that compromise distributive equity and create high per-unit administrative costs. Also, these loans have short maturities which reduce the loanable capital of RDBs. RDBs are therefore not free to select individual projects which best suit their own lending ability. Because both sources also pose a long-term danger that they can and will be reduced, funding sources should therefore be broadened. Three possibilities that are briefly discussed are deposit mobilization, bond issues, and earmarked taxes. The first two are preferred, yet they must be instituted early and RDBs must demonstrate a financial program which engenders confidence to attract these funds. A bibliography of eight sources (1971–78) is included.

AID/ta-BMA-7 931116900

087 **PN-AAH-358**

INTEREST RATE, TRANSACTION COSTS, AND FINANCIAL INNOVATIONS

Bhatt, V.V.
Ohio State University, Department of Agricultural Economics and Rural Sociology.
1979, 42 p.

Prepared for the Second International Conference on Rural Finance Research Issues, Paper No. 13

Fragmentation of the capital market — that is, the phenomena of different markets for different "products" — as it occurs in the LDCs is generally attributed to high interest rates. The crucial variable in determining these rates is transaction costs (both administrative costs and default risk). Financial innovations (changes in production and consumption functions, introduction of new goods and services, changes in organization and market forms, etc.) reduce these costs and thus lower interest rates. The economic history of Europe and the United States is a progression of such innovations — the most recent of which is U.S. department store banking. Should LDCs pass through the same stages of financial development or should they adapt existing structures to their own specific needs? The author suggests the latter, with the remainder of the document describing the evolution of a credit market in the State of Haryana in India and the innovation of the Syndicate Bank of India. In 1964, the State of Haryana was one of the three states in India to adopt new high-yielding seeds. As a result, wheat production per acre almost doubled in less than a decade. Traditionally, agricultural credit in that state had been provided by local traders, who purchased the farmer's surplus output. However, with the new prosperity, medium-sized farmers were able to use their surplus profits for lending to small farmers, driving the traders out of business with lower interest rates (15-25% per annum vs. 30-40%). The reason for the farmers' success was smaller transaction costs — they were simply better able to appraise the income potential of the small farmers. The Syndicate Bank of India is the story of a small bank seizing an area of banking (servicing small- and medium-sized enterprises in the provinces) considered unprofitable by the nation's larger, urban establishments, and introducing new "products" and processes to make it profitable. With these examples, the author emphasizes the need to move away from the usual discussion of interest rates based on "factless theorizing" and the macro approach to monetary and banking analysis. Footnotes and statistical charts are included in the report.

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088 **PN-AAH-359**

BANKING INNOVATIONS IN INDIA: A CASE OF GROUP LENDING FOR AGRICULTURE

Desai, B.M.
Ohio State University, Department of Agricultural Economics and Rural Sociology.
1979, 31 p.

Prepared for the Second International Conference on Rural Finance Research Issues, Paper No. 14

In order to increase the flow of agricultural credit to small farmers, many banks in India have introduced the innovation of group lending. The present paper reports on a limited pilot study of group lending by one bank branch in India. The study was undertaken to develop an analytical framework to determine equilibrium (supply=demand) conditions under which group lending can be considered an innovation, and to provide empirical evidence on the potential advantages or disadvantages of this innovation. Potential advantages and disadvantages of group lending for both supply and demand are distinguished. Examples of advantages are lowered transaction costs for both borrowers and lenders. Examples of potential disadvantages are increased costs of forming groups in reference to supply, and loss of individual discretion in regard to demand. Two analytical models, one with, the other without potential disadvantages, are constructed, and necessary and sufficient conditions for considering group lending an innovation are distinguished. A necessary condition is that the net demand or supply shift is greater than zero. A sufficient condition is that when the combined shift in both supply and demand is greater than zero, the net demand shift is greater than the net supply shift, or vice versa. From the cases studied, it is concluded that for group lending to be an innovation, both necessary and sufficient conditions must be justified simultaneously. It is further concluded that when the combined net shift in supply and demand is less than zero because of decreased supply, it is critical for banks to mobilize as large a demand advantage as possible. When, however, the combined shift is less than zero due to decreased demand, then an enlargement of the supply advantage is called for. These conclusions are considered valid as long as interest rates are kept flexible, rather than rigid. On the empirical level, data showed that group lending has a potential for both demand and supply advantage, the latter due to lower default risk. This conclusion is due to the fact that distance and technology factors accounted for a large proportion of differences between group and mortgage borrowers.

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089 **PN-AAH-360**

INNOVATIVE SMALL FARMER CREDIT IN NICARAGUA

Tinnermeier, R.L.; Gonzalez-Vega, C.
Ohio State University, Department of Agricultural Economics and Rural Sociology.
1979, 31 p.

Prepared for the Second International Conference on Rural Finance Research Issues, Paper No. 15

Credit has been a major component of agricultural and rural development in LDCs. This document reviews the innovative steps taken in Nicaragua by the Institute For Campesino Development (INVIERNO) to provide credit for low-income farmers. INVIERNO provides a set of integrated services directed towards local needs by dispatching teams composed of an agricultural technician (AGROMOC), an input and marketing specialist (CREDOMERC), and a community specialist, to the local Devel-

opment Center (CEDE). Much of INVIERNO's success has been due to cutting loan costs. In the field, AGROMOCs personally ascertain the needs of local residents and distribute loan applications accordingly. Applications are processed electronically, which reduces administrative costs, reduces human error, and releases CEDE personnel for other duties. Computerization, while helpful, does create problems between stations involving communication, data transfer, and coordinating data activities. INVIERNO also introduced the policy of granting credit for 5-year periods which has cut costs, since annual applications are avoided and single accounts are kept for each borrower rather than having an account for each loan operation. Group lending may further reduce costs. Considerable emphasis has also been placed on raising small farmer incomes through the adoption of new technology. Various technical packages are offered by the AGROMOCs to farmers depending upon the farmer's knowledge of credit for purchasing modern inputs. INVIERNO has been able to pursue these policies due to the quality of its management system. A competitive salary scale, liberal fringe benefits, and effective selection system have been instrumental in establishing a competent staff. Planning has a high priority, which keeps goals and approaches clear and up to date. Department and Division heads keep track of project activities and objectives, and internal and external INVIERNO evaluations are made regularly. INVIERNO has coordinated its services with other agencies to expand its outreach. In all of its programs, credit is supplied first and other services are provided accordingly. A bibliography of 28 English and Spanish language sources (1973–78) is included.

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C90 **PN-AAH-361**

THE IMPACT OF RURAL CREDIT ON PRODUCTION AND INCOME DISTRIBUTION

Sayad, J.
Ohio State University, Department of Agricultural Economics and Rural Sociology.
1979, 33 p.

Prepared for the Second International Conference on Rural Finance Research Issues, Paper No. 18

Many LDCs have used rural credit as an incentive to promote investments in their agricultural sectors. Using examples from Brazil, this paper analyzes the effectiveness of these policies and their impact on income distribution. First, the institutional and economic environment of Brazil is outlined and then a model is presented through which rural credit is analyzed. Next, the impact of these credit programs on income distribution is discussed. Empirical evidence and a summary of results conclude this report. In Brazil, agriculture is considered a high priority and economic policy continues to rely upon subsidized interest rates to induce farming investment. Brazilian officials contend that this policy allows them to control domestic prices over the short term, while simultaneously improving the growth outlook for the farming sector, which will attract private investment. The author suggest that this is an incorrect approach. He claims that borrowers will always allocate their investment resources in those areas where the highest rates of return are available. Farmers will accept these concessionary loans, but they will transfer a maximum amount of their investment funds to the most profitable enterprises. Due to import controls, which increase farm input costs, and price controls, the agricultural sector does not always promise the highest return. The substitution effect for alternate investments must also be considered. Here the effectiveness of credit policies in determining where investments will be directed depends upon such borrower characteristics as farm size or profitability. Credit programs in Brazil might be more effective if higher financial transaction costs, which would inhibit the attractiveness of alternative investments, were established. Concerning income distribution, the author contends that commercial banks prefer to supply a larger share of rural credit to borrowers that represent the smallest possible risk. These are also individuals who have the lowest transaction costs for alternative investing. Therefore, the wealthy large farmers benefit the most from these policies, which in fact increase income disparities. A bibliography of 14 English- and Spanish-language sources (1956–79) is appended.

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091 **PN-AAH-362**

A MODEL OF THE POLITICAL ECONOMY OF AGRICULTURAL CREDIT: THE CASE OF BOLIVIA

Ladman, J.R.; Tinnermeier, R.L.
Ohio State University, ,Department of Agricultural Economics and Rural Sociologyd Rural Sociology.
1979, 41 p.

Prepared for the Second International Conference on Rural Finance Research Issues, Paper No. 19

Agricultural credit has traditionally been the cornerstone of most agricultural development programs in LDCs. This document contends that although these programs are economically oriented, they are also used as an instrument for consolidating political support. A model of the political economy of agricultural credit is examined and applied to Bolivia. Conclusions and policy implications are then drawn. The model demonstrates that under typical LDC conditions of direct government control of financial institutions, concessionary interest rates, defaulting, and inflation, credit is used for both economic and political reasons. The Bolivian case clearly illustrates this point, especially during the period between 1970 and 1978 following a military coup supported primarily by the private business and large commercial farming sectors of Santa Cruz. Following the coup, concessionary agricultural credit to this area rapidly increased. The Agricultural Bank of Bolivia (BAB) increased its loans to this region to a level five times greater than that existing during the 1960's. The Bank's concessionary rates in 1973 were 15% below rates charged for other commercial loans. This situation was not new for the BAB. Since 1942, it has been assaulted by foreign critics charging that political loans had harmed the Bank's financial standing. In an attempt to alleviate this problem, the BAB has been reorganized four times. Finally, in 1979, the BAB was declared bankrupt due to loan defaulting, with 80% of the delinquencies coming from the Santa Cruz region. After 1976, another bank, the State Bank

(BDE), which had been directing 60% of its loans towards agriculture, attempted to eliminate political lending from its activities. Both banks are government controlled. Foreign donors have contributed to the bank by promulgating concessionary interest rates and by covering bank losses caused by defaulting. Decreasing defaults through legal means is the best way to correct this problem, since raising rates has major political costs. A bibliography of 18 Spanish and English language sources (1966–79) is included.

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092 **PN-AAH-421**

HUMAN LABOR USE IN EXISTING AND PROSPECTIVE TECHNOLOGIES OF THE SEMI-ARID TROPICS OF PENINSULAR INDIA

Ghodake, R.D.; Ryan, J.G.; Sarin, R.
International Crops Research Institute for the Semi-Arid Tropics (ICRISAT).
1978, 69 p.

In Economics Program, Progress Report No. 1

Labor is a key resource in the developing world — especially in the semiarid tropical (SAT) regions, where more than 500 million poor eke out a living. The purpose of this study was to determine the effect of newly developed land, water, and crop management technologies on existing labor patterns in a SAT region, in this case peninsular India. ICRISAT (International Crops Research Institute for the Semi-Arid Tropics) based its study on six villages, detailing the use of family and hired labor by 30 farmers in each village. Interviews were conducted every 2-3 weeks throughout 1975-76. The sample households were selected using stratified random sampling, with small, medium, and large farms represented equally. Topics covered in this report include labor patterns and the size of the farm, composition of labor (male/female, family/hired workers), seasonality of labor use, regional labor patterns, and labor patterns with the introduction of watershed-based technologies. For the most part, there was found to be an inverse relationship between farm size and total labor use (family and hired) per unit of land. Increased labor use by small landholders may be accounted for in one or more of three ways: (1) an increase in the intensity of cropping; (2) adoption of a more labor-intensive cropping pattern; and (3) greater use of labor per hectare under individual crops. There was a positive correlation between hired labor and farm size. With increasing prosperity, many members of wealthy families tended to drop out of the labor force — particularly women and children. Nevertheless, the extent of labor hired by small farmers was by no means insignificant. Authors conclude that the area's existing irrigation systems (tank and well) have tremendous employment-creating potential, and that the introduction of new technologies would result in competition for labor at strategic times in crop-growing seasons. Report includes a bibliography (43 publications, 1956–78).

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093 **PN-AAH-490**

JOBS FOR WOMEN IN RURAL INDUSTRY AND SERVICES

Dixon, R.B.
1979, 58 p.

Prepared for an Food and Agricultural Organization (FAO) Reform and Rural Development

Increasing landlessness, in combination with other economic and demographic forces such as increased mechanization and declines in farm size and productivity, has created a compelling need in most LDCs to expand nonagricultural employment in rural areas. Since women are more vulnerable to land eviction, earn less, and are more likely to be unemployed than men, rural development and agrarian reform policies are needed to design support systems to raise the productivity of female labor; to transform subsistence activities into income-generating ones; and to create new employment opportunities for women. This paper provides statistics on female labor in 56 countries and proposes strategies for mobilizing rural women for employment. Women constitute 20% or less of the paid labor force in 20 of the 56 countries; as low as 4-5% in some countries. This underrepresentation perpetuates their economic and social dependency and retards development. Strategies for expanding nonagricultural employment for rural women are twofold: (1) national measures to promote investments in rural areas, encourage rural economics diversification, and correct other economic imbalances undermining rural development; and (2) grass roots measures to organize employment for rural women in nonagricultural production, sales, service, and administrative/professional positions. The report concludes with a 6-step strategy to create employment for rural women: (1) identify groups of women who most need income-generating employment; (2) define the range of women's economic activities with a view toward raising their output and income-generating capacity; (3) locate indigenous social networks around which they could be mobilized; (4) establish sources of credit, technical assistance, and training; (5) determine technological needs to reduce domestic burdens; and (6) identify and overcome other cultural and structural obstacles that deny women control over the products of their labor. Footnotes and a 103-item bibliography (1965–79) are appended.

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094 PN-AAG-831

THE IMPACT OF 25 TELEVISION PROGRAMS ON "WATER", PRODUCED AND BROADCAST BY THE IVORIAN OUT-OF-SCHOOL EDUCATION PROJECT

Lenglet, F.
1976, 108 p.

Supplemented by PN-AAG-832

In an attempt to help villages of the Ivory Coast deal with the water supply problem, especially during the dry season, the Ivorian Out-of-School Education Department (OSED) broadcast a series of 25 TV programs on water and related issues during the period November 1974 to December 1975. This report evaluates the reach and impact of these programs, which constitute one element of a massive Ivorian Government information and education campaign on hygienic and sanitary measures and the use of drinking water. After a brief introduction, the research design and the evaluation methodology are outlined. Next, a discussion of the content of the 25 water programs, their development, and their outreach is presented. The programs dealt with the basic problems of water supply, quality, and pollution, the relationship between contaminated water and disease, and the various possibilities and means to obtain safe(r) drinking water. Three types of objectives were pursued by these programs and by discussion sessions led by local animators following each broadcast: (1) sensitization and information; (2) understanding and learning; (3) incitement to action. The water programs reached a considerable audience varying from 3,500 to 31,200 spectators per program. Following this, the impact of the program is discussed. The water programs created awareness of problems related to water and of solutions for the issue of a safe water supply. It is certain that people acquired new knowledge about health practices and started implementing them. The major obstacles to a real impact of the "water series" lie in the lack of local organization, the lack of access to material and organizational resources at the local level, the lack of cooperation of the administrative authorities, the lack of communication support, and the strength of traditional customs and beliefs. Finally, a summary and conclusions are presented. The authors recommend that the number of communal actions proposed in the TV programs be limited; that appropriate ministries, agencies, and private organizations cooperate more actively in program preparation and follow-up; and that the OSED promote the creation of local Tele-Clubs as a nucleus of development actions.

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095 PN-AAG-832

VISITS TO TWENTY-THREE VILLAGES TO DETERMINE THE IMPACT OF THE WATER SERIES PRODUCED BY THE OUT-OF-SCHOOL TV DEPARTMENT

Grant, S. Pierre, S.T.
1975, 97 p.

Supplemented by PN-AAG-831

In an attempt to help villages of the Ivory Coast deal with the water supply problem, especially during the dry season, the Ivorian Out-of-School Education Department (OSED) broadcast a series of 25 TV programs on water and related issues during the period November 1974 to December 1975. This report analyzes how the school animators, who run the adult educational television (ETV) discussions, and villagers react to such series broadcasts. The water programs represented the first Ivorian adult ETV series. Both mailed questionnaires and interviews with animators and selected villagers in 23 villages were used in the analysis. Major problems relating to the programs include the lack of lighting and space in the animation classrooms; the lack of understanding of program contents; irregularities of the broadcasts (due mainly to frequent animator reassignments, long technical breakdowns, and modification of broadcast times and program subjects); failure of the animators to adequately communicate program times to the villagers; the practice of viewing ETV programs outside of the animation sessions, thus missing the ensuing discussion which is supposed to promote learning and related community or personal action; lack of ethnic balance in the programs; lack of relevance in ETV topics; the lack of pay for animators; the lack of interest in ETV on the part of village leaders; the lack of village visits by OSED staff; cultural/traditional barriers making the school teacher a very ineffective and inappropriate animator; and lack of cooperation of the appropriate government agencies in program preparation and follow-up. Suggestions for improving these situations are included in each case. Recommendations were made to the OSED in 11 different areas, including assisting villagers in contacting appropriate government agencies and offices; performing field demonstrations to augment the TV programs; furnishing kerosene lamps to animators; maintaining a stricter schedule for broadcast dates and times; obtaining a more equitable distribution regarding the ethnic group and language of the program actors; and responding more quickly and more satisfactorily to questions asked by the spectators and animators.

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096 PN-AAG-833

"TELE POUR TOUS" IN RURAL IVORY COAST: AUDIENCE, IMPACT, PERCEPTIONS, REPORT OF TWO SURVEYS CONDUCTED IN JANUARY AND APRIL 1977

Etaix, M.; Lenglet, F.
1977, 250 p.

The Ministry of Primary and Television Education of the Ivory Coast produces a series of nonformal education broadcasts entitled "Tele pour Tous" (TV for Everyone — TPT). This report discusses the results of two surveys designed to assess the impact of TPT programs on rural audiences. After initial chapters explaining the research objectives, outlining the survey methodologies, and describing the characteristics of the sample villages and individual respondents, the central issues of TV watching in general and TPT viewing in particular are discussed. At present, only about 10% of the rural adult population is exposed to the TPT programs, and a large number of these TV/TPT spectators are likely to be more interested in general TV programs than in the TPT programming. The surveys showed that there is no significant regular TPT viewing audience and that even when the village schools are open, have TV sets, and attract villagers to the TPT programs, little of the discussion (animation) which is supposed to follow such programming is adequately conducted. The animation sessions are characterized by a formal primary school pedagogy which does not induce collective decisionmaking or action. This last point forms a partial explanation for the lack of impact discussed in chapter six. Important characteristics of TPT broadcasts which positively influence viewer sensitization are (1) relevancy for the potential audience; (2) attractive form with which the spectator can identify; and (3) a large number of broadcasts and/or reruns in a sequential order. However, data show that even with sensitization, few actions ever result from watching and discussing TPT programs. Chapter seven discusses the fact that almost all of the TV/TPT spectators have a positive attitude toward TV as a medium of instruction. Finally, the authors conclude that the Ivorian educational television project works, though minimally and inefficiently. Eleven recommendations are made on reorganizing TPT programming, increasing interest in TPT, and reorganizing the reception structure. Thirteen appendices on various project-related topics and a 29-item bibliography of French- and English-language references (1966–77) are included.

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097 PN-AAG-834

RURAL ADULT EDUCATION AND THE ROLE OF MASS MEDIA: A COMPARATIVE ANALYSIS OF FOUR PROJECTS

Lenglet, F.; McAnany, E.G.
1977, 66 p.

Many rural adult education projects use modern mass media as an important component. This paper is a follow-up to an effort to assist decisionmakers in the Ivory Coast in evaluating the Out of School (nonformal) Educational Television (OSTV) program. This paper compares the OSTV program with the Radio Study Campaigns (RSCs) in Tanzania, the Radio Schools of Santa Maria (RSMs) in the Dominican Republic, and the Nonformal Education Module in Guatemala. The paper begins with a short examination of the external or social benefit of rural education programs in general (as opposed to the internal benefit to the individual participants) and the reasons why programs with mass communication elements have received so much attention within the LDCs. The authors contend that the extension of education/information/communication systems must be understood as a form of state intervention which is not only development oriented, but also political and ideological. The next section provides brief descriptions of each project and a comparative analysis of these projects based on seven categories: objectives; organization; selection and training of personnel and recruitment of participants; uses of media technology; feedback and evaluation systems; effects and impact; and internal and external constraints. In terms of internal effectiveness, the authors classify the four projects in terms of the proportion of their target group reached and the impact of the programs on their audience. They consider external effectiveness to be a more important consideration, however, since all four projects are intended to attain other than immediate educational or informational objectives. The Tanzanian RSCs serve to create a permanent state of ideological awareness and mobilization to combat the causes of unemployment. The Ivorian OSTV's indirect political effect is judged to be more important than its direct educational effect. The Dominican RSM's external effects could be negative, increasing both the likelihood of a rural "brain drain" and of exacerbated urban unemployment and downward pressure on urban wages. A 44-item bibliography of English-, French-, and Spanish-language references (1967–77) is included.

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098 PN-AAG-835

THE RECEPTION AND ANIMATION OF OUT-OF-SCHOOL EDUCATIONAL TELEVISION PROGRAMS IN THE IVORY COAST: A CAST STUDY OF FOUR VILLAGES

Beneveniste, A.
43 p.

Rural animation, as a global approach to development, necessarily includes the three successive states of informing the public, educating the public, and organizing the public for action. This report represents an English summary of a French-language study to describe qualitatively the global animation process as applied in the Ivory Coast. It is based on four village case studies, and assesses public awareness of, opinions about, and reception of the Ivorian "Tele pour Tous" (TV for Everyone — TPT) nonformal education broadcasts and their degree of congruence with the sociocultural realities of each village. After a general introduction to rural animation in the Ivory Coast and a discussion of the study's methodology, case studies of four "animated" villages are presented. In each case, discussion is structured around four main areas: the flow of information in the village about the TPT broadcasts; the external and internal factors influencing public interest

A rural "animator" reinforces instructional TV lessons to Ivory Coast school children.

and attendance; the typical operation of a single TPT broadcast; and the comprehension and acceptance of the broadcast messages. According to the results of the survey, it is probably safe to say that less than 5% of the total population in these four villages had ever seen a TPT broadcast and that, in general, those who had been spectators have no social or political power in their villages. In all four villages observed, there was very little organized effort to make sure that the villagers knew about the occurrence of the TPT broadcasts and understood the scope and reasons for this program of nonformal education. The use of schools as a locale for the meetings and the use of school teachers as animators insured the failure of the program as a model of community activation for innovation or development, as teachers in the rural regions are seen as having no influence on matters external to the school. The author concludes that such broadcasts will remain but a marginal force in the task of rural animation until such time as they reach those in the village who have the social or political power needed to make decisions or initiate activities.

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099 **PN-AAG-836**

COST ANALYSIS OF NON-FORMAL ETV SYSTEMS: A CASE STUDY OF THE "EXTRA-SCOLAIRE" SYSTEM IN THE IVORY COAST

Klees, S.J.
1977, 127 p.

The Extra/Scolaire (E/S) educational television (ETV) system of the Ivory Coast produces television programming dealing with a wide variety of topics concerning agriculture, politics, economics, and culture, directed primarily toward rural adult audiences. This paper summarizes and analyzes the societal costs incurred by the E/S system. An introductory section presents the assumptions and limitations of the "opportunity cost" approach to cost analysis and describes the structure of the E/S system, the context in which it operates, and the extent to which it is utilized. The second section provides a specific estimation of the costs of the various E/S system components: administration, program production, program transmission, support materials production and distribution, program reception, and system evaluation. The estimate is based on data for the 1975-76 operating year, including amortized start-up and capital costs. Costs are estimated under two broad alternative assumptions reflecting in part the difference between building upon existing formal school system ETV capabilities (the Ivorian case) and starting from scratch (the international audience perspective). Aspects of the E/S system which may entail social costs not captured by monetary price measures are also considered. Section three translates this annualized cost description of the E/S system into cost function terms in order to view the potential cost impact of various policy decisions. The authors found the marginal costs of expanding the proportion of repeated broadcasts, the training given to animators (discussion-leaders), the production of support materials, and the evaluation effort to be low relative to total costs. They recommend that such options be pursued if they are deemed to yield significant social benefits. The authors conclude by indicating that some observers view the Ivorian E/S system as a straightforward provision of useful information to rural adults, while others question whether its passive instructional mode and lack of an integrated accompanying infra-

structure can really aid in Ivorian rural development. Various appendices and a 35-item bibliography of French- and English-language references (1966–77) are included.

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100 PN-AAG-837

AN ADMINISTRATIVE HISTORY OF OUT-OF-SCHOOL EDUCATIONAL TELEVISION IN THE IVORY COAST

Grant, S.
1977, 104 p.

The Out-of-School (nonformal) Television (OSTV) program of the Ivory Coast is producing a series of educational broadcasts entitled "Tele Pour Tous" (TV for Everyone — TPT). This study examines the basic organization, management, and evolution of the department producing the TPT broadcasts. An initial chapter describes the methodology of this study, and mentions five similar studies which might interest the reader. Basic background information on the TPT project is presented in chapter two, with sections on target audiences; general program objectives and policies; film production, transmission, and reception; content and type of TV programs produced; collaboration with government agencies; and financing. Chapter three, which contains the report's principal analysis, examines in detail six key decisions regarding the OSTV program and their consequences. Conclusions consequent upon this analysis are presented in the fourth chapter as follows: (1) It has been an uphill battle to place and maintain the out-of-school department in prominent national visibility. (2) Collaboration with other development institutions in designing, producing, and promoting out-of-school films has shown many indications of breaking down. (3) and (4) Both the use of television as the principal communications medium and the practice of broadcasting in the French language have decreased the potential reach and impact of adult education efforts, neither usage allowing programs to reach directly their main target audience — the mass of poor rural farmers. (5) Teachers turned out to be disappointingly ineffective discussion-leaders (animators). (6) Most of the key positions in the department are still occupied by French advisors, with the training of Ivorians at higher administration levels having proven unsatisfactory. The authors also mention that, although TPT is now a well-known program, it is accepted more as entertainment than as an intrinsically valuable means of educating the populace. Finally, an attempt is made to place the out-of-school program within the context of recently enunciated national planning strategies. Various appendices and a 37-item bibliography of French- and English-language references (1967–77) are also included.

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101 PN-AAG-838

A COST ANALYSIS ON INSTRUCTIONAL TELEVISION IN THE IVORY COAST

Klees, S.J.; Jamison, D.T.
1976, 70 p.

In an effort to improve the quality and relevance of primary schooling, the Ivory Coast has initiated extensive educational reform involving heavy reliance on a system of instructional television (ITV) and a substantial effort to improve the training of classroom teachers. This paper provides a detailed cost analysis of the ITV component of the Ivorian educational reform. The Ivorian ITV system began broadcasting to the first grade in 1971, reaching about 21,000 students. Expanding geographically as well as by grade level, the 1976 program will reach about 400,000 students in grades 1-6. Plans for 1980 call for all schools in the nation to utilize the ITV system with a projected enrollment of almost 700,000 students, each viewing a total of about 190 hours of programming annually. Total project expenditures for 1976 will run about $10 million (in 1972 U.S. dollars), increasing to about $15 million by 1991. As a result of substantial foreign aid, the Ivorian Government paid only about one-half of the project costs in 1976, a percentage which will increase rapidly until 1981 when the Ivory Coast is expected to assume complete system financing. In total costs, the Ivorian system is perhaps the most expensive of any reasonably similar effort. Part of this is due to relatively high production costs, but much more important factors are the high costs of reception system power (given the general lack of electrification, about 85% of the classroom TV receivers operate on expensive battery power) and maintenance. On a unit cost basis, however, the Ivorian ITV system costs fall to a reasonable level in comparison with other ITV projects. Both cost figures are about 70% higher than estimates obtained by a UNESCO technician at the start of the project. The authors conclude that, while the system is rather expensive, significant economies of scale can be achieved if the system expands as planned. Presently, no sound basis for evaluating the pedagogical, social, or economic worth of the investment in Ivorian educational reform exists. A brief section on the marginal costs of system expansion and a 19-item list of French and English language references (1969–76) are included.

AID/afr-C-1158 698038300

102 PN-AAG-839

ETV PROGRAM PRODUCTION IN THE IVORY COAST

Evans, S.; Klees, S.J.
1976, 82 p.

In 1971, the Ivory Coast implemented a nationwide educational system reform designed to improve the reach and quality of educational offerings. A primary component of this reform is the intensive utilization of educational television (ETV) in primary schools. This report evaluates the Ivory Coast's system of ETV program production. Plans for broadcast and production output from the ETV Complex in Bouake have been consistently more ambitious than achievements. Comparing planning documents to actual results indicates that the system is presently operating at only 60%

efficiency. The long run average production costs are estimated under three different assumptions, one representing the present situation and the others positing efficiency improvements. In any case, the Ivorian project seems relatively expensive when compared with other projects, although the large actual and projected student enrollments reduce the per student costs to reasonable levels. The different stages in the process of program production and the interactions between the three principal actors in the process — the producer, the printed support materials writer, and the director — are described in detail. This forms an essential background to the consideration of four key program production issues. The system lacks sufficient organization and planning to ensure that even the most straightforward necessities of program production are accomplished. There has been inadequate training of Ivorians to take over the management and operation of the ETV Complex, planned for 1980. Efforts to set up a feedback and evaluation system have been impeded by the heavy demands of the production schedule. The fourth issue, film versus videotape, is nonproblematic, but is included for the benefit of other LDCs. The authors conclude that the basic ingredients for a good ETV program production system are in place, and now that the initial coverage of the full six grades of primary school is almost complete, more time should be devoted to making improvements in the efficiency with which the system operates before the system is further expanded. A 20-item bibliography of French- and English-language references (1967–76) is included.

AID/afr-C-1158 698038300

103 **PN-AAG-840**

POST-PRIMARY OPTIONS IN THE IVORY COAST

Daniere, A.; Orivel, F.
1977, 164 p.

The post-primary education (PPE) system in the Ivory Coast faces a considerable challenge: the country already has one of the world's highest expenditures on education as a percentage of GNP, and enrollment will increase by some 300-500% by 1990. This study is intended to assist Ivorian authorities in the planning of PPE over the next decade. It is divided into two parts, the first projecting social outcomes of alternative scopes and contents of PPE, and the second considering alternative options in the technology of PPE. Part one begins with an analysis of the impact of alternative patterns of secondary student flow on social outcomes of interest. Curriculum options in complementary education (intended for all eligible students not enrolled in secondary schools) are then examined. Following this, the scheduling of access to PPE, including the control of repetitions, is discussed. Finally, some problems concerning the transition of pupils educated in TV primary schools to secondary schools are treated. Part two introduces the technological options available in the provision of secondary and complementary education, with concentration on traditional and media technologies of institutional, community, and extension education. Based on the three different classes of options discussed above (those specifying alternative PPE channels, those affecting the student flow through PPE, and those affecting the efficiency and cost of providing PPE), a restricted set of policy options is identified, each made up of vectors of one compatible option from each of the three classes. The final chapter projects public expenditures for these various PPE policies. The study concludes that the resource mobilization required to meet PPE enrollment objectives will strain Ivorian capabilities, irrespective of its financial implications, and urges the choice of policy to be limited to the less expensive options. Other recommendations include that parallel entries into the first cycle of secondary education be reduced or rationalized, that equivalent admission rules be imposed on pupils of traditional and TV primary systems, and that substantial repetitions be allowed in preparing for the PPE entrance examination.

AID/afr-C-1158 698038300

104 **PN-AAH-021**

LEARNING RESOURCE CENTER ECONOMIC ANALYSIS: A TRAINING MODULE

Blair, P.; Swett, F.
San Jose State University.
1978, 93 p.

LDC educational planners are currently examining the economic feasibility of developing and/or utilizing learning resource centers (LRCs) for community-based education programs. This manual shows how and when to apply four common methods of economic analysis (benefit/cost comparison, cost-effectiveness, cost-efficiency, and cost-utility estimation) for this purpose. It is prepared in workbook format, with illustrative examples and exercises to demonstrate the use of these analytical techniques in situations commonly faced in the field. The manual is specifically designed to enable the user to: (1) select the appropriate analytical tool; (2) obtain the needed data; (3) carry out the calculations; (4) utilize the results and implications to make recommendations to LRC decisionmakers; (5) convey the study's limitations; and (6) indicate the scope for improvement through implementing the recommendations resulting from the analysis. First, LRC project costs (inputs) and benefits (outputs) are distinguished and identified. The importance of subjective perceptions is noted and a distinction is drawn between monetary (dollar) and non-monetary (psychic) costs and benefits. A sample LRC cost/benefit balance sheet is provided and is discussed in relation to such a center's scale of operation. There follows a discussion on selecting the appropriate analytical approach based on the nature of the expected benefits. The differences between the four methods is briefly stated and these are reinforced with several short exercises. This information is expanded upon in a subsequent section, where specific economic analyses of LRCs are presented utilizing each of the four methods, where appropriate. In each case, the text is liberally supplemented with exercises to encourage active reader participation. The manual concludes with a brief epilogue concerning the economic analysis "uncertainty principle", pointing out that only two of the three factors of time, money, and accomplishment can be accurately specified in advance of the completion of any project. A 6-item glossary of vocabulary is appended.

AID/la-G-1169 598057300
Also available in Spanish: PN-AAH-022, 97 p.

105 **PN-AAH-026**

RESOURCE INVENTORY FOR LEARNING RESOURCE CENTER-BASED COMMUNITY EDUCATION SYSTEMS: SIMPLIFIED INDEX ADAPTED FOR JUNE 1979

Ofiesh Associates, Inc.
1979, 188 p.

In 1976, A.I.D. initiated a project to implement a model learning resource center (LRC) for use in community based education systems (BCES) in Latin America. The resource inventory provided in the present document is designed to serve as a model of a materials filing and retrieval system for use by LRC-BCES administrators in locating and obtaining teaching/learning materials for community education programs in rural Latin American locations. Approximately 800 entries offer brief descriptions of books, workbooks, textbooks, guides, films, cassettes, and records. Based upon the needs assessment and feedback from potential users, this list of written and audiovisual materials covers 74 subject areas pertaining to health, home and personal care, agriculture and forestry, crop production and marketing, animal husbandry, organization and management, construction, education, and technical trades. The materials, dating from 1952 to 1977, are either in English or Spanish, and some are in both languages. All entries were carefully evaluated. Materials finally accepted were judged on the basis of six criteria: (1) subject matter; (2) suitability to the knowledge level of the target audience; (3) language; (4) reasonability of cost; (5) availability; and (6) uniqueness (not a duplicate of other materials). The names and mailing addresses of 376 distributors in the U.S., Latin America, and Spain are listed.

AID/la-G-1169 598057300
Also available in English and Spanish: PN-AAH-025, 307 p.; Spanish: PN-AAH-027, 143 p.

106 **PN-AAH-142**

TRAINING INSTITUTIONS OFFERING COMMUNICATIONS COURSES TO DEVELOPING COUNTRY PERSONNEL

Moulton, J.; Spain, P.
Stanford University, Institute for Communication Research.
1978, 350 p.

In anticipation of an increasing demand for training in development communications and educational technology for personnel from developing countries, A.I.D. commissioned an overview of U.S. and European institutions offering graduate training in these areas. This document presents this overview in two volumes. Information provided in these volumes goes beyond that generally available in university catalogues. Course orientations and faculty backgrounds particularly germane to developing country needs are highlighted, although no judgement is made regarding the quality of course offerings. Emphasis is placed on training in broadcasting and in social science approaches to communication and development. Journalism training or training in the engineering aspects of communications are excluded. Volume one is an annotated listing of 70 institutions that either presently offer, or have the potential to offer, communication for development training. Institutions are listed in three categories, namely, U.S. universities, U.S. non-academic institutions, and Canadian and Western European organizations. Each institution is described briefly in terms of programs relevant to this survey, faculty and student activities, and interest expressed in further cooperation with A.I.D. Volume two provides detailed descriptions of 15 of the U.S. universities listed in volume one. The history, staff experience, and student body composition are discussed for the following universities: Cornell, Florida State, Texas, Wisconsin, Michigan State, San Francisco State, Stanford, Syracuse, Indiana, Chicago, Hawaii, Massachusetts, Pittsburgh, Southern California; and the East-West Communications Institute in Hawaii. These universities provide graduate training in development communications, with emphasis on such areas as research and policy planning, electronic media, and instructional technology. Both volumes are part of an A.I.D. series of studies on the use of education technology and communications for development.

AID/ta-C-1472

107 **PN-AAH-186**

BASIC EDUCATION IN EGYPT: REPORT OF THE JOINT EGYPTIAN-AMERICAN SURVEY TEAM

Human Resources Management, Inc.; Joint Egyptian-American Survey Team.
1979, 273 p.

A joint Egyptian-American team conducted a 3-month survey to identify the strengths and weaknesses of Egypt's educational system. This document, the result of that survey, describes the history, infrastructure, administration, and finance of Egypt's educational system in 11 technical reports. The inherent social, economic, and geographical differences among Egyptian families are discussed. These socio-economic disparities are prevalent in all levels of Egypt's formal educational system. The low enrollment and high dropout rate in Egyptian schools, and the illiteracy among a major proportion of Egypt's population are also discussed. Supplementary school services have not been able to rectify this problem, as indicated by reports on special education, nutrition, and health services. Improvements in these areas would further tax the physical and financial resources of the educational system. Several reports indicate severe shortages in textbooks, equipment, buildings and trained teachers. The establishment and operation of Egypt's schools is the responsibility of the Ministry of Education (MOE). A report on the organization and functions of MOE reveals deficiencies in the Ministry's educational planning, policy formation and research capabilities. A final technical report discusses Egypt's budgetary process, with particular attention given to educational finance. Allocation, structural, and technical constraints within the educational budget are examined. Strategies designed to address problem areas are suggested and programs requiring external sources and expertise are listed. School enrollment and curriculum statistics, planned activities of the National Council for Education Research, and a list of survey team members are included. The authors recommend that when evaluating budgetary and program decisions a cost-benefit and/or an internal rate of return approach should be used, but only

after existing data and data handling systems are improved. In the short term, MOE should set up a performance budgeting system to measure the effectiveness of ongoing programs. Over the long-term, a nationwide school finance plan, using a scientific equalization formula, would equalize educational opportunities throughout Egypt.

AID/afr-C-1198 263000500

108 **PN-AAH-368**

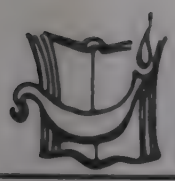
THE BRAZIL CHEMISTRY PROGRAM: AN INTERNATIONAL EXPERIMENT IN SCIENCE EDUCATION

National Academy of Sciences, National Research Council, Board on Science and Technology for International Development. 1979, 27 p.

The National Research Council of Brazil and the U.S. National Academy of Sciences (USNAS) carried out a 7-year experimental program in postgraduate research and teaching in chemistry. The objectives of the program were to develop a Brazilian research capability in certain key fields of chemistry and to stimulate long-term cooperative research collaboration in chemistry between Brazilian and American scientists. In this document, the USNAS assesses the program, which proved truly cooperative both in spirit and in fact. Professors and institutions and joint projects were established in various fields at the University of Rio de Janiero and at the University of Sao Paulo. The objectives of the program were met, but with qualifications. Many graduate degrees (76 in all), both on the Masters and Ph.D. levels, were awarded as a result of this project. Brazilian research capability was developed in most of the target fields of chemistry and most of the projects have continued since the formal end of the program. New methods of teaching, learning, and addressing scientific problems were developed and a valuable international dimension was acquired. The program also served a valuable purpose in stimulating greater exchange and cooperation among faculty members of the host chemistry departments. Although large numbers were not involved, the program mechanism enabled a group of young American chemists to become involved in Brazil's scientific work. Some problems did exist, however. The project terminated abruptly, causing disruptions in ongoing projects. A gradual phaseout might have been preferable. In addition, Brazilian support for research and teaching in chemistry has dwindled in the last few years and this has caused difficulty in supporting ongoing exchange between scientists. Lessons learned from this experiment include the following: (1) strong educational institutions should be the focal points for graduate teaching and research; (2) host country commitment needs to be strong and long-range; and (3) programs should be linked to national development needs.

AID/ta-C-1433 931122300

A student practices the techniques of chemical research.



EDUCATION

109 **PN-AAH-604**

THE COMPARATIVE FUNCTIONALITY OF FORMAL AND NON-FORMAL EDUCATION FOR WOMEN: FINAL REPORT

Derryck, V.L.
1979, 194 p.

With limited resources and competing priorities, development and education planners are debating which educational mode (formal or nonformal) will assure the greatest benefits to women in LDCs in terms of increased incomes, greater control over their lives, and more influence in community and familial decisionmaking. The nonformal system offers short-term, flexible, and inexpensive training in basic literacy, numeracy, and job skills, but it is plagued by lack of status and specific linkages to available employment opportunities. Though formal education has years of tradition and prestige behind it, it is costly, diminishing in quality, and inaccessible to the vast majority of the rural poor. This final report presents the findings of a study to determine which educational mode is more functional for accelerating the integration of LDC women into development efforts. First, the study's parameters, terms, and definitions are briefly described. Next, a historical view of American and colonial African education is provided to determine its relevance to the developing world. The education models indicated that female education benefits national development. Literate women contribute to development by participating in the labor force, molding attitudinal development in children, and by being members of an informed electorate. An overview of the current status of women in formal and nonformal education reveals that women face discrimination in education in terms of access, enrollments, and career guidance. A renewed emphasis on female literacy is advocated. Political constraints to equal economic opportunity in female education are identified and the prospects for change within the near future appear to be small. The major suggested recommendation is the strong encouragement of formal education for females aged 6-14 and nonformal skills training for those over age 14. Conclusions are drawn that women should be educated because: (1) an illiterate population hampers development; (2) it is costly and counterproductive not to educate them; (3) increased education causes decreased fertility; and (4) it is politically advisable. Footnotes and an 88-item bibliography (1957–78) are appended.

AID/otr-147-78-14

110 **PN-AAG-986**

HEALTH CARE TRAINING MANUAL FOR THE VILLAGE HEALTH PROMOTER: INSTRUCTOR'S MANUAL

Project Concern International.
1978, 238 p.

Trainee's manual: PN-AAG-987, 342 p.

Rural health aide programs are one of the most cost-efficient means utilized by LDC governments to improve the health conditions in the rural areas of their country. This manual was developed to assist instructors in training volunteer village health promoters. It begins with a few general tips for the instructor and then presents 36 short training units on how to treat the most common illnesses and methods for preventing many of them. Each unit is structured similarly, with a statement of its objectives, suggested activities, review questions concerning a preceding lesson, sources for further information concerning the topic at hand, and specific suggestions for the instructor. Some sections also contain short plays, audio-tutorials, and filmstrips to reinforce the message presented. The instructor's manual is divided into two parts, the first outlining the 26-unit basic training course for village health promoters, and the second presenting 10 suggested units for additional training. The basic course contains units on: what causes sickness; keeping clean; sanitation; teaching the village about health; food; introduction to health problems; diarrhea; fever; colds; cough; ear problems; malaria; conjunctivitis; impetigo; ringworm; abscesses and boils; open sores and wounds; burns; toothache; constipation; worms; scabies; venereal disease; conclusion to health problems; and clinics for children under 5 years of age. The additional training units cover: fractures and shock; injections and immunization; tuberculosis; measels; whooping cough; family planning; leprosy; hepatitis; tetanus; and rabies. Four appendices contain lists of: (1) teaching suggestions; (2) audiovisual aids (and distributors); (3) newsletters which regularly contain useful information on low-cost teaching aids and articles on new developments in education, health, sanitation, agriculture, etc.; and (4) a list of resource books written in English, Spanish, or French.

AID/pha-G-1101 932007000

111 **PN-AAH-262**

CONDUCTING A RURAL HEALTH SURVEY: EXPERIENCE FROM THE VILLAGE HEALTH SURVEY, DANFA PROJECT, GHANA

Belcher, D.W.; Wurapa, F.K.; Nicholas, D.D.; Kpedekpo, G.M.K.; Ofosu-Amaah, S.; Derban, L.K.A.; Asante, R.O.
University of California at Los Angeles, School of Public Health; University of Ghana Medical School.
1975, 81 p.

Danfa Comprehensive Rural Health and Family Planning Project, Ghana, Monograph Series No. 9

Health surveys of rural populations are valuable in determining health needs, planning useful health programs, and supplementing misleading health statistics. The literature on methods used to plan such surveys, however, is scarce. In an effort to remedy this situation, this report outlines the steps used to plan and pretest a longitudinal health survey conducted as part of the Danfa Comprehensive Rural Health and Family Planning Project in Ghana. The survey was conducted, in three cycles at two year intervals, in 20 randomly selected villages. Major steps in planning the health survey were setting objectives, organizing the survey, and preparing background materials. Extensive pretests were carried out in order to test survey methodology, become acquainted with the study population, and provide team training under field condi-

A rural health aide vaccinates village children against disease.

tions. In addition, a staged series of communications were aimed at community members and officials in order to obtain a high response rate to the survey. These initial efforts were successful: 97.5% of the sample population participated in the survey. The survey clinic operated in four areas: (1) logistics, including ordering of supplies and record forms, and providing for transportation; (2) arrangement of clinic stations in conjunction with community leaders; (3) registration and medical examination of study subjects; and (4) collection of the completed examination forms and termination of the clinics. Concluding that the health survey outlined in the present report is replicable in other developing countries, the survey team makes a series of recommendations on how to adapt the survey to meet regional and national health information needs. A list of 25 references on health, nutrition, and population in Africa is appended, as well as the 1975 Village Health Survey interviewer instructions, and examination procedures and forms.

AID/CM/afr-IDA-73-14 641005500

112 **PN-AAH-270**

EXPERIENCE IN SELECTING, TRAINING, AND SUPERVISING INTERVIEWERS IN A RURAL HEALTH PROJECT: DANFA PROJECT, GHANA

Belcher, D.W.; Wurapa, F.K.; Lourie, I.M.; Kwabia, K.; Avle, S.K.
University of California at Los Angeles, School of Public Health; University of Ghana Medical School.
1976, 30 p.

Danfa Comprehensive Rural Health and Family Planning Project, Ghana, Monograph Series No. 11

Several monograph papers have been written to inform concerned U.S. and African agencies of experience gained from the Danfa Comprehensive Rural Health and Family Planning Project, a project designed to demonstrate and test new low-cost health delivery systems in Ghana. This paper describes the recruiting and training of five classes of interviewers over a 20-month period (1970–71), when baseline studies were conducted for the project. The initial training provided to eight Ghana national census staff members did not carefully develop their interviewing skills, nor did recruiting procedures adequately determine the interviewer's language proficiency or competence. Project managers diagnosed these problems and revised the training program accordingly. It was found that language proficiency was not tested; that the course consisted of classroom instruction with minimal field practice under close supervision; that the interviewer's performance levels, attitudes toward work, and acceptable behavior toward the village, were not examined; and that the project staff failed to evaluate the incoming enumeration data on a daily basis. Remedies for the training program are discussed in terms of improved recruiting and selection practices of interviewer trainees, (job qualifications, work benefits offered, and screening), subsequent revision of the training course, in-service training, and evaluation of training courses. Discussions of these remedies more fully detail the following recommendations of the authors: (1) Course supervisors should be exposed to field conditions and should conduct household interviews in the same communities where trainees will be working. (2) Trainees should be held in a probationary status until their work is acceptable. (3) By increasing the amount of course time spent in the field, clearly defined instructional objectives for interviewing can be developed and feedback provided to the trainee of his progress toward becoming a skilled interviewer. Ten references (1960–73) are cited at the conclusion of the report. Also included are sample forms for student evaluation of lectures, supervisor evaluation of trainee performance, and the individual field interviewer's evaluation record.

AID/CM/afr-IDA-73-14 641005500

113 **PN-AAH-595**

PLANNING PHARMACEUTICALS FOR PRIMARY HEALTH CARE: THE SUPPLY AND UTILIZATION OF DRUGS IN THE THIRD WORLD

Gish, O.; Feller, L.L.
American Public Health Association (APHA).
1979, 147 p.

In APHA International Health Programs Monograph Series, No. 2

The importance of the supply and use of pharmaceuticals for primary health care in LDCs has been relatively neglected in the general health literature. This monograph lessens this deficiency by analyzing supply conditions, procurement planning, and drug utilization systems in the Third World. Many LDCs have little or no nationally-based drug industry and thus little control over drug production and prices. Production has largely fallen into the hands of a few transnational pharmaceutical companies who often are unwilling to set up production in LDCs, thus contributing to a lack of indigenous drug production. Because drugs must then be imported, they become prohibitively expensive. To alleviate this situation, countries should procure information on the extent to which leading firms are cornering the market; pass legislation to control advertising and abusive practices; and promote national drug self-sufficiency, quality control, local packaging of drugs, and, most important of all, close cooperation between industrial and health planners. National procurement planning is usually unavailable. The first step in establishing such planning should be the creation of a formulary of quality, safe, and cost-effective drugs reflecting national therapeutic needs. Centralized, bulk procurement is suggested, as is the use of the World Health Organization's International Nonproprietary Names. Dispensing of drugs in LDCs is also a problem due to the lack of graduate pharmacists and misinformation of health workers regarding the correct use and cost of formulary drugs and the hazards they present to patients. Drug use systems must therefore be developed through education of physicians, pharmacy and health workers, as well as the general public; establishment of standardized prescribing from limited formularies and of national drug classification systems and central delivery units; and increases in the number of pharmacy workers (as distinct from graduate pharmacists). This report contains annexes concerning abuses in the patient licensing agreements and regulatory practices in selected countries; a list of essential drugs; a glossary of terms and a 14-item bibliography (1970–78).

AID/ta-C-1320 931097100

114 PN-AAH-596

TRAINING AND USE OF AUXILIARY HEALTH WORKERS: LESSONS FROM DEVELOPING COUNTRIES

Storms, D.M.
American Public Health Association (APHA).
1979, 146 p.

In APHA International Health Programs Monograph Series, No. 3

As the use of auxiliary health workers (AHW) in expanding basic health services to LDC communities grows, data on effective program elements for particular settings need to be shared. This monograph, jointly developed by the American Public Health Association and A.I.D.'s Office of Health, draws upon contributions from knowledgeable AHWs in various LDCs and is designed for use by health planners as a practical sourcebook on ways to design, manage, and evaluate auxiliary based health services, and to plan, implement, and evaluate programs to recruit and train AHWs. An introduction describes generic issues in the design and management of auxiliary-based health services with emphasis on village-level programs and community participation. The next two chapters concern health program design and support systems development, and describe alternative strategies for assisting countries to develop their own resources for improved health care delivery. To function effectively, auxiliaries need a support system which includes government, community, and private sector commitment and resources. Once a funding basis and an approved budget exist, program planning should begin with an assessment of the health needs, resources, and resource requirements. Next, an administrative framework and program specifications such as services, job analysis, and compensation should be developed; and resource requirements, legal sanctions, and an implementation schedule should be established. The fourth chapter describes the recruitment, final selection, and training of AHWs, emphasizing recruitment and selection criteria and methods, and training curricula and methods. The fifth chapter concerns program implementation, including deployment of the AHWs, community mobilization, program management, and the supervision and continuing education of auxiliaries. Finally, program evaluation and the evaluation of AHWs are described. A 313-item bibliography (1934–79), divided according to the sections of the monograph, is appended.

AID/ta-C-1320 931097100

115 PN-AAH-203

METHODS OF MALARIA VECTOR CONTROL: A STATE OF THE ART LITERATURE REVIEW

Davis, R.; Blevins, G.
United States Department of Health, Education, and Welfare, Office of International Health.
1979, 145 p.

During the period May to October 1978, the Office of International Health of the U.S. Department of Health, Education, and Welfare was involved in the preparation of a draft study entitled "Malaria Vector Control: A Review". The study was undertaken in response to the appearance of resistance to DDT and other insecticides among anopheline mosquitoes, the carriers of malaria. The present document, a state-of-the-art literature review, represents the final revised version of the October 1978 study, and attempts to summarize new and old information on all forms of malaria vector control. It includes both those forms presently in use or under development, and those which were largely displaced with the postwar advent of DDT house spraying. After an introduction describing the study's objectives and scope (restricted to technological control methods), the report begins with a concise summary of what is known about residual house spraying with the insecticides currently in use or under trial. A detailed description of the non-spraying measures in past and present use, as well as those currently under development follows. Each technology is reviewed from the standpoint of efficacy, feasibility under field conditions, environmental acceptability, and costs. An effort is made to outline the requirements for planning, organizing, and evaluating vector control campaigns. Finally, a list of possible research topics in vector control methods is included for the benefit of prospective researchers and sources of research funds. These are grouped into five general categories: (1) past and current measures against adult mosquitoes; (2) past and current antilarval measures; (3) past and current combined measures; (4) biological control methods currently under development; and (5) planning, organization, and evaluation. Included in the report are sections on World Health Organization estimates of vector control costs and on the acute toxicity of pesticides used in malaria control. A bibliography of some 450 references (1938–79) is appended.

RS/HEW-01-74 GTS

116 **PN-AAH-531**

TSETSE AND TRYPANOSOMIASIS CONTROL: A STRATEGY FOR THE FUTURE IN AFRICA

Interafrican Bureau for Animal Resources
1979, 60 p.

Twenty-two species of tsetse fly and at least six species of trypanosomes are known to transmit sleeping sickness to man and trypanosomiasis to livestock, especially on the African continent. Out of desire to control tsetse vectors in furtherance of African development, a task force of experts from African and international donor agencies and institutions was organized to provide counsel to A.I.D. on appropriate research and action. This report presents their findings and recommendations. The first sections briefly describe the tsetse fly and its habits, including feeding and reproductive behavior, and the mechanism of trypanosome transmission; and trypanosomiasis in animals, its socioeconomic impact, and human sleeping sickness. The task force proposes the development of effective national and regional programs for tsetse and trypanosomiasis control through improved field and research capability to eradicate these insects. To this end, the task force presents 13 recommendations. Studies on the biology, ecology, behavior, and vectoral capacity of tsetse should be intensified. Concerned countries should be supported in preparing programs designed to implement national policy on tsetse and trypanosomiasis control. Projects that are both designed to control or eradicate the diseases and that involve the development of new land areas should be closely integrated with planned land development and current agricultural practices, but with careful consideration of cost-benefit ratios. It is strongly recommended that national multidisciplinary tsetse/trypanosomiasis units be established in each country where trypanosomiasis is endemic. Bilateral agencies should support training and provide basic diagnostic tools to improve present medical surveillance. Research should be continued on selective uses of existing insecticides which do not damage the environment. More effective, less persistent insecticides, as well as other methods of control, should be developed. Academic institutions and others should intensify studies to find more effective and less toxic drugs to treat sleeping sickness and trypanosomiasis. Other recommendations are also included. Twenty references (1970–79) are cited for further reading.

AID-698-001-T 698013500

The tsetse fly, carrier of trypanosomiasis (sleeping sickness).

117 PN-AAG-984

WHOLE SOYBEAN FOODS FOR HOME AND VILLAGE USE

Nelson, A.I.; Steinberg, M.P.; Wei, L.S.
University of Illinois at Urbana-Champaign.
1978, 31 p.

Commercial processing of whole soybeans, a high-protein, low-cost food source, must be simplified if soy products are to have wide applicability as a food source for the undernourished of developing countries. This document contains five papers that develop concepts, methods, and processes for home use of the whole soybean for human food consumption. The first paper discusses the home preparation of whole soybeans. To remove the soybean's objectionable flavor and to enhance food value, the lipoxygenase enzyme is inactivated and antinutritional factors are eliminated through the boiling of soybeans in water to which sodium bicarbonate (baking soda) has been added. This cooking process is then applied to a variety of home preparations to produce flavorful and highly nutritional soy products. The next paper describes four methods for home preparation of soy milk, a viable substitute for people who are intolerant or allergic to cow's milk. In each method, raw soybeans are moistened and heated before being ground into a slurry to avoid objectionable flavor. Soy milk prepared from whole beans is considered superior to similar products prepared from cracked beans and full-fat soy flour. A simple recommended procedure for the home preparation of soy milk is described in the paper. The third paper examines the hydration and tenderization of cooked soybeans to which cereals or vegetables are added. This nutritious combination, containing 50% whole soybeans, requires less cooking time and is used to produce convenient breakfast foods and fried patty-meat substitutes. The fourth paper discusses the development of prototype, processed food products derived from whole soybeans such as a canned soybean-chicken product and dried soybean-fruit weanling food for children. The final paper considers the yield, price, and protein content of five Indian dals (pulses). A processing scheme is described to develop soybean dal similar to the indigenous dals at a competitive price. Brief bibliographies (33 in total, 1943–76) follow each paper.

AID/ta-C-1294 931056000

A high-protein corn/soya/milk blend provided under the Food for Peace program supplements this child's diet.

POPULATION

118 PN-AAH-253

INFANT AND CHILD MORTALITY IN THAILAND: LEVELS, TRENDS, AND DIFFERENTIALS AS DERIVED THROUGH INDIRECT ESTIMATION TECHNIQUES

Knodel, J.; Chamratrithirong, A.
East-West Center, East-West Population Institute
1975. 46 p.

Papers of the East-West Population Institute. No. 37

Using indirect estimation techniques, infant and child mortality trends and differentials can be derived from survey and census data which show the proportion dead among children ever born. These indirect techniques are particularly valuable when registration data are deficient. Although mortality may be understated by these techniques, trends appear to be reasonable and consistent with those independently calculated. This study employs such indirect techniques to examine national, regional, and urban/rural levels and trends as well as socioeconomic differentials in infant and child mortality in Thailand. Infant mortality in Thailand appears to be declining at all levels. Moderate regional mortality differences exist, however. Mortality conditions appear to be worse in the north and northeast than in the south and central regions. Infant mortality is lowest in the central region and highest in the north. These differentials, however, are of questionable validity since the south is culturally more distinct from Thailand's other regions and may have a different level of reporting accuracy. They may also reflect peculiarities of the data rather than an actual trend. Child mortality is substantially lower in the urban sector than in the rural sector. The average life expectancy of a child born in Bangkok is almost 14 years longer than that of a child born in the countryside. This urban advantage is due to higher socioeconomic levels and easier access to superior health services. Substantial socioeconomic differences in infant and child mortality exist. There is a sharp inverse relationship between both the mother's level of educational and occupational attainment and child mortality, and a positive correlation between working mothers and child mortality. There is no significant relationship between religious affiliation and child mortality. It is evident that children of the higher socioeconomic strata enjoy more favored mortality levels than those of lower socioeconomic position. Documentation of such differences should help to guide a national health policy to extend the favorable conditions which reduce mortality to a broader spectrum of the population. A 17-item bibliography (1966–73) is appended.

AID/csd-G-1056

119 PN-AAH-255

DEMOGRAPHIC RESEARCH IN JAPAN, 1955-70: A SURVEY AND SELECTED BIBLIOGRAPHY

Matsumoto, Y.S.
Hawaii University School of Public Health
1974. 81 p.

Papers of the East-West Population Institute. No. 30

During the decade following World War II, demographic research in Japan focused on the problem of excess population. During [illegible] period, Japan experienced the inevitable baby boom. At the same time the nation's death rate was rapidly declining, a result of public health programs. The difference between increased fertility and reduced mortality resulted in the highest population growth rates, from natural increase, in Japan's history. By 1955, the necessity of restricting population growth had become obvious to the Japanese. Having experienced this population boom in the midst of a depressed economic situation, the Japanese were strongly motivated to limit their families in order to improve their aspirations for a better life. Thus, it was [illegible] the government, which first took steps to restrict family size. The present report consists of an overview of indigenous demographic research in Japan during the period 1955–70, followed by a selected bibliography of works by Japanese authors. Topics covered in the overview section include a discussion of research institutes, recent trends in demographic research, demographic studies on fertility, mortality, population and the economy, and the population future in terms of demographics. The author notes that population growth in Japan is essentially under control, with an annual rate of natural increase stabilized at about 1.1% per year. With a highly educated, affluent, and urbanized population, Japan is among the world's most highly industrialized nations. Its demographic concerns now relate to regional imbalances, manpower deficiencies, and social welfare. For this reason, the focus of demographic research is shifting from the national population as a whole to specific segments of the population. The bibliographic section of the report is preceded by a subject index and includes 373 entries.

AID/csd-5310 $3.09

120 PN-AAH-

SOME RESULTS AND PROBLEMS ON THE ESTIMATION OF VITAL RATES IN A RURAL AFRI[illegible] SETTING VIA MULTIPLE METHODS

Kpedekpo, G.M.K.; Wuraola, F.K.; Lourie, I.M.; Neumann, [illegible]; Belcher, D.W.
University of California at Los Angeles, School of Public He[illegible]
University of Ghana Medical School.
1975. 39 p.

Danfa Comprehensive Rural Health and Family Planning Pr[illegible] Ghana, Monograph Series, No. 4

Effective management of a public health program requires [illegible] compilation of detailed demographic information on age, [illegible] mortality, cause of death, etc. This paper is one of a series [illegible] cerning vital events registration and baseline demographic [illegible] views conducted for the Danfa Rural Health and Family Pla[illegible] Project in Ghana. Specifically, it presents the results of a re[illegible] experiment on the collection and analysis of data on births [illegible] deaths using the well-known Chandrasekhar-Deming [illegible] approach method. The site of the study was located 10–50 [illegible] from Accra, an area with approximately 50,000 rural inhabit[illegible] First, baseline data were gathered on age, sex, family relation[illegible] education, religion, ethnic group, and pregnancy status. Fo[illegible] up surveys were carried out at 6-month intervals in order [illegible]

Congestion in Calcutta.

...reave the matching and accuracy of data on births, deaths, and migration. In designing their experiment, project personnel attempted to overcome the major difficulty of accounting for three broad classes of events inherent in any registration or survey. These classes of events include: (1) those that occur in the sample area to usual residents; (2) those that occur to residents when they are away from the area; and (3) those that occur to visitors to the sample area. A number of variables were selected for the matching of vital events: the house number, the name of the child/deceased, the sex of the child/deceased, date of birth/death, place of birth/death (and residential status), name of the mother (for births), and age at death for the deceased. Problems arose due to differences in receiving and recording information on names, and because of the large number of items to be compared and verified. In addition, problems involving memory lapse, mobility of individuals and households, and other factors suggest that some uniform method should be developed so that matching can be done with greater accuracy. In addition, the manual matching operations used in this experiment were time-consuming and delayed publication of results. Data from the registration and surveys are presented in tabular form and are discussed in the text.

AID/CM/afr-IDA-73-14 641005500

121 PN-AAH-323

ON THE END OF THE POPULATION EXPLOSION

Demeny, P.
Population Council
1979, 38 p.

In Center for Policy Studies Working Paper No. 39

Today any interested customer can choose among an impressive variety of population forecasts. One such forecast by Donald J. Bogue and Amy Ong Tsui foresees zero world population growth by the year 2000. This paper examines that prediction. Bogue and Tsui, respectively, are Director and Assistant Director of the Community and Family Study Center, a well-known research and training organization at the University of Chicago. Their forecast merits special attention because it exemplifies some problems in methods and interpretations prevalent in contemporary population literature. According to the author, Tsui and Bogue's assessment of recent fertility declines must be viewed with skepticism. That birth-rates have been declining in countries composing the majority of the world's population is a fact established beyond reasonable doubt. However it is doubtful that the declines postulated for key developing countries (China, Indonesia, and Egypt) were as large or even nearly as large, as the two authors claim. The same applies to the contention that key South Asian countries (India, Pakistan, and Bangladesh) may have entered a stage of accelerating fertility decline, or that the majority of African countries have experienced appreciable fertility decreases. Caution is also warranted regarding Tsui and Bogue's estimates of future fertility

trends. Their central thesis focuses on family planning as the prime explanation of both already observed (1968–75) and future fertility declines. The main prop for that thesis was multiple regression analysis. However, the validity of a causal interpretation of numerical findings in a regression analysis is dependent on the validity of the relationship of the variables in question. Tsui and Bogue assumed the validity of the relationship posited in their model, and proceeded directly to computing the regressions and interpreting results. This is acceptable practice only if the computation in question rests on well established theory, or if the direction of the causal relationships are sufficiently evident without further argument. Report includes footnotes and a listing of all papers issued by the Center for Policy Studies in 1977 and 1978.

AID/pha-C-1199 932063200

122 PN-AAH-250

A COMPILATION OF AGE-SPECIFIC FERTILITY RATES FOR DEVELOPING COUNTRIES

United States Department of Commerce, Bureau of the Census.
1979, 158 p.

In International Research Document No. 7

To interpret fertility levels and patterns for a given country, it is useful to examine a consistent set of fertility data. This publication presents a compilation of age-specific and total fertility rates for 126 LDCs of Africa, Asia, Latin America, and Oceania. Rates are shown either directly, as derived from vital registration systems, surveys, or censuses, or as adjusted by various techniques, particularly the Brass fertility technique. The data are compiled as part of an ongoing program of the International Demographic Data Center (IDDC), Population Division, U.S. Bureau of the Census (BOC), to maintain a comprehensive data base containing demographic information on LDCs. Selected data from this data base, including the rates shown in this report, are regularly provided to A.I.D. and are used by the IDDC staff as a starting point in establishing a consistent set of data for selected countries. The data in this publication are not evaluated and do not represent estimates made nor condoned by the BOC. (For evaluated data, users may refer to the BOC's other publications, *Country Demographic Profiles* and *World Population*.) Data are presented chronologically in tabular form. Corresponding notes are labeled by the year of reference of the data. In cases, however, where particular censuses or surveys have yielded retrospective rates for a series of years in the past (and it is usefull to examine these rates in a block rather than interspersed with rates from other sources) these rates are presented in tabular form by source, rather than in chronological order. In all instances, the type of data collection system (survey, census, vital registration), source of the data, and/or method used in estimating or adjusting the rates are cited in the annotation which follows each table. The data cover the period from 1960 to 1979, although rates for earlier years are often included for countries that lack recent information. In most cases, only national data are presented, but rates are shown for rural or urban areas, particular geographic regions, and ethnic or religious groups in cases where national data are scant or nonexistent.

RS/COM/BUCEN-03-78 932064900

123 PN-AAH-251

SPATIAL FERTILITY ANALYSIS IN A LIMITED DATA SITUATION: THE CASE OF PAKISTAN

Fuller, G.; Khan, M.M.
East-West Center, East-West Population Institute.
1978, 25 p.

Papers of the East-West Population Institute, No. 56

Fertility rates are generally explained by analysts in terms of socioeconomic variables. This paper, published by the East-West Population Institute, analyzes fertility data from Pakistan as a test case to argue the benefits of an aereal or spatial analysis of fertility data to explain linkages left unexplained by socioeconomic analysis. The spatial approach is based on the assumption that linkages between fertility and socioeconomic characteristics vary systematically over space. On the basis of this assumption, inferences can be drawn about these linkages when data are incomplete or limited, as is particularly true in Pakistan. Basically, inferences are drawn, though with less accuracy, in much the same way that topographic maps are created. (In mapmaking, direct measurements of elevation are made at only a few points, with the geographer interpolating between the observation points.) In the present study, district level data from 1951 and 1961 censuses were used to construct fertility trend surfaces in three orders. First-order (planar) surfaces indicated that, in general, fertility is highest in the northwest and lowest in the southeast. While second-order surfaces add little beyond this, third-order surfaces, which are the most accurate of all, reveal lower fertility in the south, east, and northeast, thus modifying (without negating) the northwest-southeast generalization revealed in the lower-order surfaces. Positive residuals (exceptions) from third-order surfaces can have a practical value for program planners faced with strategic choices in regard to fund allocation. For example, it can be inferred from 1951 residuals that high fertility districts probably possess abnormal linkages between socioeconomic variables and that resource allocation in these areas would have a higher probability of success. Similarly, the shape and pattern of 1961 residuals indicates that economic development along the Indus River Valley may be responsible for increased fertility rates, implying a strategic response such as including fertility costs in the costs of development projects. The study concludes with suggestions for improving spatial methodology. A 16-item bibliography (1959–78) is appended.

AID/pha-G-1058

124 PN-AAH-252

REGRESSION ESTIMATES OF CHANGES IN FERTILITY, 1955-60 TO 1965-75, FOR MOST MAJOR NATIONS AND TERRITORIES

Palmore, J.A.
East-West Center, East-West Population Institute.
1978, 64 p.

Papers of the East-West Population Institute, No. 58

Since the registration of births is inadequate worldwide, knowledge of world fertility trends must be based on estimates using alternative data sources. Using data from the 1970 round of censuses, this paper updates and revises regression equations proposed by Bogue and Palmore in 1964 and summarizes fertility changes for most major nations and territories. Using census and vital registration data, regression equations for estimating direct fertility measures (the total fertility rate and age-specific fertility rates) from indirect fertility measures (the child/woman ratio) were calculated. These equations were used subsequently to estimate the direct fertility measures for countries lacking good vital statistics. Employing the above methods, the paper estimates trends in fertility for the LDCs for the periods 1955–60 and 1965–75. Data are presented in the following four tables: (1) regression estimates for major countries and territories of national crude birth rates and total fertility rates for 1955-60, crude birth rates for 1970-75, and average annual percentages of change in fertility rates; (2) number of countries experiencing increased or decreased fertility rates (1955–60 to most recent census year for which data were available); (3) percentage distribution of estimated crude birth rates for 163 countries (most recent census year for which data were available); and (4) regression estimates of national crude birth rates, total fertility rates, and age-specific fertility rates for most recent census year available (major countries and territories). The probable margins of error and other limitations in the regression procedures are also discussed. The results support the contention that most of the countries reduced their fertility between 1955–60 and 1965–75. Despite these declines, however, fertility rates for much of the world remained very high as of the latest census. The fertility transition is, at best, only at the beginning stages for many countries. Illustrative tables, regression equations, and a 20-item bibliography (1949–78) are appended.

AID/pha-G-1058

125 PN-AAH-258

ESTIMATES OF INDICES OF FERTILITY FROM REGISTRATION DATA

Kpedekpo, G.M.K.; Nicholas, D.D.; Ofosu-Ammah, S.; Wurapa, F.K.; Belcher, D.W.
University of California at Los Angeles, School of Public Health; University of Ghana Medical School.
1975, 46 p.

Danfa Comprehensive Rural Health and Family Planning Project, Ghana, Monograph Series No. 3

Despite efforts to improve the registration of vital events in developing countries, it is likely that available demographic data in these nations will be seriously defective for a long time to come. It is therefore necessary to obtain as much profit as possible from existing data. This paper attempts to derive indices of fertility using data obtained from vital events registration and baseline demographic surveys conducted under the Danfa Rural Health project in Ghana. (The project included a longitudinal study of approximately 50,000 rural inhabitants, 10–50 miles from Accra.) The author, following Brass's method, proposes that the most effective way to extend existing registration data is to collect further information on the maternity history of mothers (i.e., the number of children ever born and the number surviving) at the time of registration or notification of birth. Using such baseline data, several indices of observed and estimated fertility are demonstrated. These relate to the average number of children per mother, the average number of children per woman, age-specific fertility rates, total fertility rates, gross reproduction rates, relative age-specific fertility rates, age-specific order birth rates, crude birth rates, general fertility ratios, and child/woman ratios. In addition, age patterns are analyzed in order to classify age-specific fertility rates according to different patterns, and to study the age structure of fertility in the project area. Lotka's analysis of stable population relationships has shown that the higher the intensity of fertility (the mean number of children per woman), the higher the rates of increase; also, the lower the mean age at motherhood, the higher the rate of increase. From this it can be concluded that population policy must aim not only at reducing the average number of children per mother, but also at increasing the mean age of motherhood as well. Report includes a very brief bibliography (nine items, 1939–73) and numerous tables illustrating the various data and findings.

AID/CM/afr-IDA-73-14 641005500

126 PN-AAH-259

AN ANALYSIS OF THE POPULATION SIZE, AGE/SEX DISTRIBUTION

Kpedekpo, G.M.K.; Lourie, I.M.; Wurapa, F.K.; Belcher, D.W.; Neumann, A.K.
University of California at Los Angeles, School of Public Health; University of Ghana Medical School.
1975, 42 p.

Danfa Comprehensive Rural Health and Family Planning Project, Ghana, Monograph Series, No. 6

Several monograph papers have been written to inform concerned U.S. and African agencies of experience gained from the Danfa Comprehensive Rural Health and Family Planning Project, a project designed to demonstrate and test new low-cost health delivery systems in Ghana. As part of the project's research component, this paper analyzes population size and the age/sex distribution of the project's four study areas. In addition to these areas, information was sought on ethnic composition, religion, occupation, literacy, and level of education. The methods used to measure these variables, as well as the difficulties involved in this use, are discussed in each section of the report. The population was enumerated in three ways: de jure (permanent residents, whether present or away), de facto (those actually present), and comprehensive (the combination of the two). Depending on the

method of enumeration, the total population of all four areas ranges from 47,655 to 50,127. In individual enumerations, the de jure enumerated population was always less than the de facto enumerated population. The geographic distribution of the population, as well as the distribution by residential status, indicates that population differences result from the estimated number of visitors and absent residents. The age of those under 15 computed by de jure enumeration ranged from 46.2% to 48.3%, while the proportion of the total population aged 65 and above ranged from 4.2% to 6.0%. The percentages under 15 and over 65 are similar by both de facto and comprehensive enumeration. Age/sex pyramids indicate a population with a low median age of 17, a very small proportion of elderly persons, and a combination of high birth and death rates. The median age for females is consistently higher than that of males. Child/woman ratios give evidence of high fertility in some areas, but fertility may be falling in others. As many of those interviewed were illiterate, the accuracy of age reporting and the Myer's procedure used to correct possible distortions are discussed. Tables illustrating these data are provided throughout the report. Four entries (1972–74) are cited for further reference.

AID/CM/afr-IDA-73-14 641005500

127 PN-AAH-260

AN ANALYSIS OF MARITAL STATUS, EDUCATION, ETHNIC, RELIGIOUS, AND OCCUPATIONAL COMPOSITION

Kpedekpo, G.M.K.; Wurapa, F.K.; Belcher, D.W.; Neumann, A.K.; Lourie, I.M.
University of California at Los Angeles, School of Public Health; University of Ghana Medical School.
1975, 40 p.

Danfa Comprehensive Rural Health and Family Planning Project, Monograph Series, No. 7

Several monograph papers have been written to inform concerned U.S. and African agencies of experience gained from the Danfa Comprehensive Rural Health and Family Planning Project, a project designed to demonstrate and test new low-cost health delivery systems in Ghana. As part of the research component of the project, this report describes selected social and economic variables for marriage, education, ethnic, religious, and occupation characteristics of the population in the project's four study areas. These study areas, comprising 50,000 rural inhabitants living 10–50 miles for Accra, are defined by the type of health service administered (comprehensive, health education, family planning, and standard). The pattern of marriage is surprisingly similar in all four areas: age at marriage for both males and females was estimated at 23.7, 23.4, 22.6, and 23.9 years for areas one, two, three, and four and five respectively. There does exist a differential in the male and female ages at marriage, but this differential is essentially the same in all areas. There is considerable differential among the educational and literacy levels from one project area to another, with area one in the favoured position relative to the other three areas. With respect to ethnic composition, all project areas show significant variations in the proportion of the population who are Akwapim, Ewe, or non-Ghanaian. In addition, areas two and three have a large number of residents who follow traditional religious practices. Although the major occupation of persons economically active in all four project areas is farming and other agricultural activities, the proportion employed in farming in each area does not vary greatly. Several graphs and charts are provided to illustrate the data. Four entries (1953, 1968) are cited for further reference.

AID/CM/afr-IDA-73-14 641005500

128 PN-AAH-475

A CHECKLIST FOR EVALUATIVE OVERVIEWS OF FAMILY PLANNING PROGRAM ACTIVITIES

Reynolds, J.
Columbia University, International Institute for Study of Human Reproduction.
1973, 20 p.

In Manuals for Evaluation of Family Planning and Population Programs, No. 6

Program evaluations should be objective, systematic, comprehensive, and useful. That is, they should be objective in the selection of topics; systematic in approach; inclusive of all studies of program activities; and establish a link between evaluation and planning. Family planning program evaluations do not always satisfy these criteria. Current family planning evaluations are frequently limited to clinic service statistics and Knowledge-Attitude-Practice sample surveys. To remedy these lapses, this report outlines the essential components of a comprehensive evaluation of family planning program activities. To be useful, evaluations should include the following: need for family planning services; description of quantity and quality of services; identification of factors that facilitate or impede acceptance of services; analysis of data gaps; listing and bibliography of research and evaluation studies underway or reported; summaries of apparent strengths and weaknesses of program activities; and recommendations for research and future evaluations. An overview of needs, operation, processes, resources, and evaluations, should be provided, as well as a checklist of program planning, operation, and evaluation elements. The report includes a checklist to be submitted when evaluating family planning programs.

AID/csd-2479 GTS

129 PN-AAH-476

THE IMPACT OF FAMILY PLANNING PROGRAMS ON FERTILITY RATES: A CASE STUDY OF FOUR NATIONS

Teachman, J.; Bogue, D.J.; Londono, J.; Hogan, D.
University of Chicago, Community and Family Study Center.
1979, 62 p.

Documentation that family planning programs are capable of inducing major and rapid decline in fertility is still quite scarce. This monograph tests hypotheses linking family planning programs to changes in fertility by assembling data for four specific LDCs. The first chapter sets out a methodology for measuring the impact of

family planning programs on birth rates. Two packaged computer programs (PROJTARG and TABRAP) are used for calculating the contraceptive protection (number of new acceptors) that must have been attained in the test area in order to have resulted in the observed fertility rate reduction. The proportion of protection provided by inside-program as compared with outside-program sources is then estimated to the maximum extent possible. With this information, the net proportion of total contraceptive protection provided by the organized family planning program can be determined under differing assumptions about the substitutability of contraceptives (the number of acceptors who would have used other methods if the formal program had not existed). This model is then applied to four countries — Colombia (treated on both a national and a state-by-state level), Thailand, Indonesia, and Korea. These four countries have all sponsored vigorous family planning programs since at least 1970. Each of these family planning programs is shown to have been the major source of contraceptive protection by which observed fertility declines have been achieved. Presentation of the Colombian example includes a detailed discussion of the use of various demographic techniques to obtain consistent estimates of fertility levels and contraceptive usage. In the Indonesian case, the impact of the family planning program is not judged by comparing contraception provided by the program against required contraception, as reliable data needed for the computer programs was not available. A births-averted procedure was used instead. The studies in the Thai and Korean cases also suggest that government support for family planning programs is crucial. Sizable (15-25 items) reference bibliographies are included after each chapter.

AID/pha-C-1108 932061900

130 **PN-AAH-605**

JOINT IGCC/IFRP EAST AND SOUTH EAST ASIA SEMINAR ON REGIONAL FERTILITY RESEARCH, BANGKOK, THAILAND, 1979

International Fertility Research Program (IFRP).
1979, 219 p.

A joint Inter-Governmental Coordinating Committee (IGCC)/International Fertility Research Program (IFRP) seminar on regional fertility research was held in Bangkok, Thailand, July 18–20, 1979. The seminar was attended by a total of 48 participants and resource persons and 11 observers, representing 10 countries of East and Southeast Asia: Indonesia, Malaysia, Nepal, the Philippines, Singapore, Thailand, Hong Kong, Japan, Korea, and Taiwan. Its objectives were three-fold: (1) to provide a forum for exchange among health/fertility professionals of experiences and research either completed or ongoing in the participating countries; (2) to enhance their awareness of IFRP's activities; and (3) to help define regional needs in contraceptive safety research, introduction and transfer of new technology, and maternity health research. This report of the seminar summarizes its proceedings and group sessions and contains the text of 29 papers — nine country papers (Thailand excluded) and twenty professional documents. The latter describe primary health care delivery systems; studies of Depo Provera, risks and benefits of contraception; sterilization camps; outreach systems; clinic management; use of traditional birth attendants; effects of steroidal contraceptives (oral pills) on Asians; maternity care monitoring; acceptability of family planning in Malaysia and Indonesia; and incidence and follow-up of trophoblastic diseases (moles). This document is a valuable resource for use by fertility/family planning professionals in Asian countries since it contains detailed research findings, references, and lists of previous surveys and research studies as well as ongoing projects. A roster of seminar participants, observers, support staff, steering committee, and resource persons is appended.

AID/pha-C-1172 932053700

131 **PN-AAH-614**

OWN-CHILDREN ESTIMATES OF FERTILITY FOR THAILAND BASED ON THE 1970 CENSUS

Retherford, R.D.; Pejaranonda, C.; Cho, L.; Arnold, F.
East-West Center, East-West Population Institute.
1979, 59 p.

In Papers of the East-West Population Institute, No. 63

Accurate estimates of Thailand's birthrate levels and trends are needed to monitor the Thai government's large-scale family planning program and to ensure the efficient operation and optimal allocation of family planning funds among the country's different geographic areas. This paper, employing data from the 1970 census, provides own-children estimates of fertility levels, trends, and differentials for Thailand over the 1960s decade. These estimates appear broadly consistent with other published estimates. Total fertility for the country declined slightly from about 6.5 to 6.2 children per woman between 1960 and 1969. All four regions of the country — North, Northeast, Central, and South — showed total fertility rates between six and seven children per woman for 1960–64. By 1965–69 total fertility rates had fallen by slightly over half a child in the North and Central regions, remained almost unchanged in the South, and increased slightly in the Northeast. Levels and trends differed greatly between rural and urban areas. Rural total fertility declined slightly from about 6.7 in 1960–64 to about 6.5 by 1965–69. Urban total fertility, which was about 1.5 children lower than rural total fertility in 1960–64, fell substantially from 5.0 to 4.0 children by 1965–69. Among rural women, those with no education slightly raised their fertility between 1960 and 1969, while those with primary education slightly reduced their fertility. Rural women with more than a primary education showed a substantial fertility decline, but they were too small a proportion of all rural women to affect overall rural fertility. Among urban women, fertility declined considerably in all educational strata. Age at marriage changed little over the 1960s, so that trends in marital fertility closely paralleled trends in overall fertility. Estimates by occupation showed slight fertility decline among rural farmers and miners, with total fertility close to seven children per woman; and large fertility declines among urban professional, technical, and administrative workers, with total fertility between two and three children per woman. Illustrative tables and a 41-item bibliography (1940–79) are appended.

AID/DSPE-C-0002 932064800

132 **PN-AAH-615**

SOCIOECONOMIC AND CULTURAL ASPECTS OF MARRIAGE AND FERTILITY IN URBAN PAKISTAN

Karim, M.S.
East-West Center, East-West Population Institute.
1979, 32 p.

In Papers of the East-West Population Institute, No. 63

Historically, a well-established inverse relationship between a woman's age at marriage and her fertility has existed worldwide. Female age at marriage has important implications for the study of fertility, because the length of the female reproductive period is largely determined by the age at which a woman marries. Little research has been done on the relationship between age at marriage and fertility in Pakistan. Furthermore, most of the studies concerning this relationship have ignored its social and cultural aspects. Using data from the 1968-69 Pakistan National Impact Survey of 1,114 currently married urban women aged 15-44, this paper relates the fertility of urban Pakistani women to their ages at marriage and identifies influential sociocultural and economic factors. The religious support given to universal and early marriage, segregation of the sexes, taboos against premarital sex, limited contraceptive use, and a large-family norm contribute to the low mean age at marriage and high fertility of Pakistani women. Mean age at marriage reported by this sample was low (16), although among younger women it was higher (17.5). Mean fertility among those aged 35-44 was 6.7 births, but it was 29% lower among women who married at age 19 or later than among those married at age 16 or earlier, even though women who had postponed marriage reproduced faster. Cumulative fertility differentials were found among ethnic groups, socioeconomic groups, and residential groups who married at younger and older ages. Duration of marriage and first pregnancy interval were important predictors of the inverse relationship between age at marriage and cumulative fertility. With duration of marriage controlled, cumulative fertility was 14% lower among late-marrying women than among those who had married early; with first pregnancy interval controlled, cumulative fertility was 32% lower among late-marrying women. Since parents consider daughters as liabilities and, therefore, mate them at an early age, raising the legal female age at marriage from 16 to 19 must be accompanied by basic changes in women's socioeconomic roles if a fertility decline is to take place in Pakistan. A 25-item bibliography (1954–79) is appended.

AID/DSPE-C-0002 932064800

133 **PN-AAH-900**

A REFERENCE COMPILATION OF SCIENCE AND TECHNOLOGY OFFICIAL DEVELOPMENT ASSISTANCE FURNISHED BY A.I.D. FOR THE LESS DEVELOPED COUNTRIES (LDCs)

Reynolds, A.; Gaithwright, T.
Logical Technical Services Corporation.
1980, 88 p.

Prepared for the United Nations Conference on Science and Technology for Development

This research report, summarizing official development assistance provided by A.I.D. to LDCs, was produced to meet the needs of participants in the United Nations Conference on Science and Technology for Development. It represents a synthesis of A.I.D.'s economic assistance philosophy, which is characterized by a twofold thrust: (1) a "basic human needs" approach to bilateral development assistance, which combines the furthering of U.S. interests abroad with U.S. humanitarian interest in that quarter of the world's population condemned to live at a substandard level; and (2) a refocussing of A.I.D.'s assistance to LDCs from sophisticated technology to light-capital, labor-intensive applications of scientific and technological developments. The report concentrates on development assistance in the fields of health, nutrition, and population; energy and natural resources; employment, trade and industrialization, and access to technology; food, climate, soil, and water; and urbanization, transportation, and communication. In each case, the relevant technologies and means of technology transfer are discussed in conjunction with a statement of the development problem addressed by these technologies and with illustrative examples of A.I.D. programs. The report concludes that comparatively little U.S. technology can be transferred to LDCs without significant adaptation. The LDCs have become aware of the need for technologies tailored to fit their resource endowments and absorptive capacities, and stress is being placed on the development of more appropriate technologies as well as on devising policies and institutions permitting LDCs to make better technological choices. An extensive subject index is included in this report.

AID/DSAN-C-0021 931023200

134 **PN-AAH-218**

MOROCCO ENERGY STUDY

Jacobs, A.B.; Farber, E.B.; Gordon, M.; Izbickas, V.; Melby, E.D.K.; Westerfield, J.D.
United States Agency for International Development, Development Support Bureau, Office of Energy.
1978, 67 p.

In November 1978, a team of six U.S. energy specialists assisted the Government of Morocco (GOM) in defining energy policies to further economic development and reduce Moroccan dependence on foreign oil. This report presents the team's findings and the conclusions drawn therefrom. Three areas were reviewed: shale oil development, with emphasis on *in situ* retorting; hydroelectric production; and nonconventional energy sources. Oil shale represents Morocco's largest potential indigenous energy source. Its development is essential if imported fuels, which currently cover 80% of the nation's needs, are to be reduced over the long term. Confirmed resources within the Atlas mountains have the potential for delivering up to 22 million barrels of oil annually, the national consumption level in 1976. However, such problems as the ultimate use of the oil, the disposal of ash, provisions for water, and the reduction of sulphur content, have not been addressed. Recommendations focus on the need for a comparative analysis of alternative exploitation methods and for *in situ* field tests. Studies on hydroelectric power conclude that decentralization may be more economical than major project initiatives, such as at Tarfaya, where costs are estimated to be five times greater than the present national average. Systems studies for improved use of existing plants and for devising more economical uses of salt are recommended. In the area of nonconventional energy, the team endorses the GOM's proposed solar center and recommends increased training and planning development to clarify organizational structure and objectives. Along with biomass studies, the establishment of projects in a decentralized pattern is also suggested. To insure that future GOM energy investments do not detract from those in other sectors, energy development on a regional rather than national level is advocated. The report concludes with recommendations for A.I.D. assistance to the GOM in areas of renewable energy sources and shale oil development which would reduce the need for nuclear development. A bibliography of French-language resource materials (1972–78) is appended.

DS/EY

135 **PN-AAH-389**

THE CONTRIBUTION OF RENEWABLE RESOURCES AND ENERGY CONSERVATION AS ALTERNATIVES TO IMPORTED OIL IN DEVELOPING COUNTRIES

Palmedo, P.F.; Baldwin, P.
Energy/Development International.
1980, 187 p.

LDC's (non-OPEC) now account for 15% of the world oil demand. This demand is expected to grow from the current eight million barrels per day (MBD) to 20-25 MBD in the year 2000. This paper addresses the role of renewable energy sources and conservation in meeting the future energy demands of developing countries. It appears possible that renewable energy sources (biomass, solar, wind, small-scale hydro, and geothermal) could reduce that demand 8–15%. Of these sources, it is solar energy which appears to have the greatest potential in reducing oil demand. Possible applications include solar/thermal for water heating in industry and in commercial and residential buildings; solar/electric (central), involving large land areas of collectors, a tall receiving tower, special boilers, and turbogenerators; and solar/electric (decentralized), using photovoltaics for irrigation, village street lighting, public buildings, and residences. It is estimated that 10-20% of the LDC oil demand could be reduced through conservation. A lack of trained personnel and of institutions capable of developing and

maintaining small-scale renewable energy systems are the principal obstacles to the utilization of these new energy sources. In addition, LDC governmental and private sector policymakers have maintained a cautious attitude regarding renewable energy sources — primarily due to their perception of the industrialized nations urging such sources upon LDCs without according them a high priority in their own nations. Another constraint to the use of renewable energy sources is the fact that the major lending and research institutions assisting developing countries are oriented to large-scale, capital-intensive technologies. Authors conclude that the nontechnical constraints to renewable and energy conservation strategies are the most formidable. They recommend that the U.S. and other industrialized nations step up their technical, economic, and institutional assistance in the development of these energy sources.

AID/SOD/PDC-C-0301 931000300

136 **PN-AAH-499**

SOLAR ENERGY, WATER, AND INDUSTRIAL SYSTEMS IN ARID LANDS: TECHNOECOLOGICAL OVERVIEW AND ANNOTATED BIBLIOGRAPHY

Duffield, C.
University of Arizona, Office of Arid Lands Studies.
1978, 163 p.

In Arid Lands Resource Information Paper No. 12

Solar energy technology is quickly coming to the forefront of existing and new energy systems. This paper provides an overview of solar energy technology, examining solar energy at the level of industrial ecosystems or technoecosystems, and the relationships of these systems to the arid lands of the world. The paper presents technoecology as a useful approach for understanding, designing, and managing solar-powered industrial systems and as capable of providing a basis for coherent, comprehensive, successful solar energy research and development strategy. The paper also discusses why solar-based civilizations may soon be a part of our world and makes projections about when they may arrive and what they may be like. Past, present, and future interactions of sunlight, water, and technoecosystems in arid lands are examined. This is done through a series of analogies comparing solar energy technoecosystems to biological ecosystems. These analogies include evolution, succession, symbiosis, niches, competition, optical concentration, and other phenomena which occur in both the industrial and biological worlds. Solar collectors are discussed as analogous to plants in design, organization, and arid adaptations. Photovoltaic solar cells are considered analogous to chloroplasts, but without the latter's need for water. In addition, the cost effectiveness of solar cells over the next few decades in relation to fossil fuels is discussed. The paper discusses, as one of its main themes, that within a few decades, solar power will replace fossil fuel power. Solar technologies for water processing are reviewed. Recommendations include: the need for effective international cooperation, development of cheap solar cells, and nurturing of a new solar consciousness. Attached to this technological overview is a 125-item, supplementary reference bibliography (1965–78). An extensive annotated bibliography of 100 references (1966–77) is also appended.

AID/ta-G-1111 211(d) 931015900

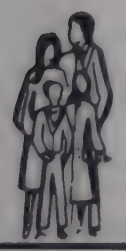
137 **PN-AAH-629**

TUNISIA ENERGY STUDY: A COOPERATIVE PROGRAM IN ALTERNATIVE ENERGY RESOURCES AND TECHNOLOGIES

Gorden, M.; Westfield, J.D.
Development Sciences, Inc..
1978, 25 p.

In October 1978, a team from the United States went to Tunisia to determine the preparedness of the Government of Tunisia (GOT) for a cooperative program in alternative energy resources and technologies. This project discusses coordination of alternative energy resources and technologies between the U.S. and Tunisia. The willingness of the GOT to act on these issues was evident and was displayed through the assembling of data and in processed data sets. A coordinated plan for fossil fuels is in place. A financial mechanism which is ideally suited for stimulating alternative energy technology is also in place. In regard to resource mobilization, although ample resources such as sun and wind exist, knowledge of appropriate technologies is limited. The major weakness in meeting the criteria applied lies in a lack of familiarity with the range of technologies of renewable energy. Training in these technologies through both "hands-on" and some formal presentation is needed. Recommendations for this plan include the following: (1) a program of in-country training, education by experience in alternative energy; (2) collaboration by the U.S. and Tunisia's Ministry of Agriculture in the design of a project to use alternative energy technologies in rural energy settings; (3) provision of a short-term U.S. specialist in central solar electricity generation; (4) assistance by A.I.D. to the Ministry of Energy in designing a study on alternative uses of organic material; and (5) organization of a technical trade or sales seminar on alternative energy technologies. A list of participants in this study as well as an 11-item bibliography in French and English which covers the period 1977–78 are appended.

AID/DSAN-C-0059 298003500



138 **PN-AAG-936**

POOR RURAL HOUSEHOLDS, TECHNICAL CHANGE, AND INCOME DISTRIBUTION IN DEVELOPING COUNTRIES: INSIGHTS FROM ASIA

Sisler, D.G.; Colman, D.R.
Cornell University, Department of Agricultural Economics.
1979, 321 p.

In Agricultural and Economics Research 79-13

Although the population of Asia is immense, its land mass vast, and its agriculture varied, one factor, rice, serves as a common denominator for this disparate group of nations and people. This report, concentrating on wetland rice production, assesses how the adoption of improved agricultural technology has influenced agricultural production and income distribution on small Asian farms. Asian rice yields have increased significantly over the past decade through use of modern varieties, fertilizers, agricultural chemicals, and water management techniques. Concern is increasing, however, as to the way in which the benefits have been distributed among rural families. The report begins with an overview of the research and study areas, and continues with discussions of patterns of household income, production systems, and household time allocation and labor market operation. A final section summarizes the findings and draws some conclusions and policy implications. It was found that mechanical technology and herbicides are not indispensible complements to the central "Green Revolution" components of modern varieties, fertilizer, and irrigation; and being substitutes for labor, they have no significant place in the production systems of labor-abundant small farms. Even though the new rice technology has had a significant positive impact on rice yields, output, and, to a lesser extent, employment in South and Southeast Asian countries, there is still much room for progress. Farmers have been highly receptive to the new seed-fertilizer technology and are very capable of perceiving what is to their economic advantage. The constraints causing farmers to underemploy resources were found to be largely outside their control, but susceptible to policy action. Another policy-related item is the direct influence of political intervention in the factor markets (e.g., target rice yields which exceed the economic optimum) on economic returns from adopting technology. A 24-item constraints bibliography (1965–78) and a 44-item general bibliography (1962–79) are appended.

AID/ta-C-1327 RES 931059400

139 **PN-AAH-023**

COMMUNITY ADVISORY GROUP DEVELOPMENT FOR LATIN AMERICAN RURAL COMMUNITIES: TRAINING OF ADVISORY GROUP FACILITATORS TRAINING MANUAL

Johnson, Gary L.
San Jose State University.
1978, 127 p.

A community advisory group (CAG) is a self-help group of citizens who serve as intermediaries between rural citizenry and formal organizational structures to bring together the human resource potentials within communities and the sociopolitical resources available at regional, state, and national levels. CAGs assess individual and community needs and promote self-development, community education and development, and national development. Without CAGs or other intermediaries, lower socioeconomic and rural populations, lacking formal education and formal group organizational structures, would remain dependent and subservient to outside controls. This training manual contains instructional methods used to train both CAG facilitators and members. The learning components, objectives, and activities of four instructional units are provided. Unit one, a basic communication unit, discusses one- and two-way communication, human transactions, and self-awareness. The purpose of this communication unit is to acquaint community members with the CAGs potential for personal, social, and economic development. Units two and three, concerning group membership dynamics and group leadership dynamics, describe the interpersonal skills needed by facilitators and members to function in a CAG. These skills include: identifying individual and community needs, learning to communicate in CAGs, and decisionmaking. The fourth instructional unit provides a basic understanding of CAG structure and methods. Topics discussed include the origin of CAGs, a survey to determine community needs, the participation of local organizations to promote CAGs, and the selection of CAG members. Each unit concludes with several related "experience activities", which are group exercises to be led by the facilitator. Because the rural campesino population of Latin America is largely illiterate, this manual relies on oral instruction. The manual is available in both English- and Spanish-language versions.

AID/la-G-1169 598057300
Also available in Spanish: PN-AAH-024, 160 p.

140 **PN-AAH-226**

A SELECT ANNOTATED BIBLIOGRAPHY OF SOCIAL SCIENCE MATERIALS FOR UGANDA, FOLLOWED BY AN EXPANDED BIBLIOGRAPHY

Hoben, S.J.
1979, 57 p.

Literature about the social sciences can be very beneficial to personnel working on development projects. This document contains a selected annotated bibliography and an expanded bibliography in order to identify available clearly written, nontechnical publications in the social sciences that will assist USAID personnel and contractors in planning and implementing development programs in Uganda. The selected annotated bibliography embodies three main headings. The first covers history, politics, and socioeconomic settings. Within the historical section, sources dating from pre-colonial times up to the rise and fall of Amin are included. The political section covers literature on both national and local political institutions and the ideological trends that are now influencing political developments in Uganda. The final section covers socioeconomic references that discuss some of the nation's 5-year economic plans. The second main section covers ethnic and regional background material. In particular, anthro-

pological studies are cited and specific ethnic and regional groups are investigated. The last section covers social aspects of development topics relevant to Uganda, such as agriculture, education, health, women, and transportation. The expanded bibliography then follows, containing references to books, selected primarily from the social science field and published between 1969 and 1979, that relate to USAID development concerns in Uganda. A list of additional information resources is appended.

AFR/EA

141 **PN-AAH-254**

THE VALUE OF CHILDREN IN ASIA AND THE UNITED STATES: COMPARATIVE PERSPECTIVES

Fawcett, J.T.; Arnold, F.; Bulatao, R.A.; Buripakdi, C.; Chung, B.J.; Iritani, T.; Lee, S.J.; Wu, T.
East-West Center, East-West Population Institute.
1974, 74 p.

Papers of the East-West Population Institute, No. 32

How can the value of children be assessed? Although the task is difficult, research on the value of children is needed to better understand the determinants of human fertility and to suggest guidelines for fertility regulation policies. In this study, designed to provide knowledge of how different cultures perceive satisfactions and costs of children, the value of children is defined as twofold: positive values, or satisfactions, and negative values, or costs. Positive values include emotional benefits, economic benefits and security, self-enrichment and development, identification with children, and family cohesiveness and continuity; negative values include emotional costs, economic costs, restrictions or opportunity costs, physical demands, and family costs. Comparative findings from six countries are reported: Japan, Korea, China (Taiwan), the Philippines, Thailand, and the U.S. (Hawaii). For each country, results of three contrasting socioeconomic groups are analyzed: urban middle class, urban lower class, and rural. Results are based on interviews with 2,500 young couples having at least one child. About 360 couples were interviewed in each of the Asian countries, 557 in Hawaii to permit comparison of Caucasian, Japanese, and Filipino ethnic groups. Cross-culturally, child-rearing is an activity characterized by ambivalence, but with benefits outweighing costs. Findings reveal a contrast between emotional benefits of having children emphasized by the urban middle class, and economic benefits emphasized by rural respondents, with the urban lower class falling between the two. Economic costs of children are of importance even to the more affluent middle class, although they are less concerned about financial costs than are other socioeconomic groups. The urban lower class show the most concern about costs. Population policy implications of the findings are discussed. Authors suggest that policy recommendations be made in a country-specific context with sociocultural factors considered. Suggested policies include old age pensions, parent education programs, large family taxation, etc. Descriptive tables and a 6-item (1968–74) bibliography are appended.

AID/pha-G-1058

142 **PN-AAH-273**

COMMUNICATIONS PRETESTING

Bertrand, J.T.
University of Chicago, Community and Family Study Center.
1978, 149 p.

In Media Monograph Series, No. 6

The majority of social development programs around the world stand to benefit from communicating their activities through the mass media. Most program administrators will invest in communication that will effectively reach a target population but will avoid squandering limited resources on costly productions that create negative results in the field. Through pretesting, the reaction of a group of individuals to a communication can be measured, resulting in the possibility of diffusing the most acceptable, most appropriate communication possible. In a "how-to" format, this monograph presents suggestions for pretest designs for radio and television spot announcements, posters, pamphlets, and movies, as well as techniques in initially designing, conducting, and analyzing the results of the pretest. For any type of media, pretests are designed to identify those messages which are potentially most effective, namely, which are: most attractive and gain the most attention; most easily understood; most acceptable and least likely to create a negative reaction; best at creating the feeling of self-involvement with the topic; and most persuasive. The pretests presented in this pamphlet all adhere to the following criteria: they are economical; they require no special pretesting equipment or test facilities; they can be carried out by people with limited research training; most are appropriate for use in developing countries with nonliterate populations; and they yield results that can be hand tabulated for rapid feedback to the communications staff. Personnel who should be involved in this activity include the director of the organization (to ensure that the pretest is being implemented in ways which will improve the communications program) and members of the research division (to objectively evaluate the pretest results). When a separate research division is not available, the communication staff itself may evaluate the pretest; however, the persons who designed the pretest should neither conduct the pretest nor tabulate the results. At the conclusion of the monograph, the author provides four sources (1968, 1973, 1975) for further reference.

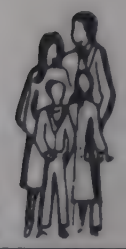
AID/csd-3314 931095800

143 **PN-AAH-469**

MARGUI-WANDALA DIVISION (NORTH CAMEROON): AN ANNOTATED BIBLIOGRAPHY

Nkwi, P.N.; Kamanda, B.; Nassourou, S.
Yaounde University, Department of Sociology.
1979, 81 p.

The present situation of the ethnically diverse peoples of the Margui-Wandala Division of Cameroon can only be understood in the light of their past history. These ethnic groups may be divided into two broad categories on the basis of the predominant factor of religious affiliation: an influential Moslem minority, and the Kirdi, or



pagan, majority. The latter is a farming people of animist belief who have been forced to take refuge in mountain villages by historical vicissitudes. There they have remained cut off from the outside world and from change, while surviving harsh conditions in adapting to the natural environment. Their persistence in living in isolated areas has caused great problems of conscience for the Government of Cameroon, which is doing everything possible to bring these people to the plains and to the benefits of modernization. Ethnic values are firmly ingrained, however, as is the fear of the consequences of transportation to the plains. This annotated bibliography on the history and characteristics of the Kirdi peoples, as well as of the Moslem, has been prepared for those involved in assisting these people in the process of development. The bibliography has been compiled in three parts. The first part gives a general summary of central themes covered by the authors including: historical background, populations, social structure, kinship structure, habitation, marriage, religious beliefs, political organization, agriculture, and migration and resettlement. The second part presents each bibliographic entry with a brief annotation. The third section discusses works which were unable to be annotated. The bibliography consists of 60 entries, (1951–79) mostly in French with a few in English, 49 of which are annotated.

144 **PN-AAH-473**

THE SOCIOLOGY AND POLITICAL ECONOMY OF THE SAHEL: AN ANNOTATED BIBLIOGRAPHY

Horowitz, M.M.; Lewis, J.V.
Institute for Development Anthropology (IDA).
1979, 35 p.

Prepared for the Workshop on Social Analysis of Development Programs and Projects

Development officers and contractor personnel who work with programs in the Sahel can benefit from using this 171-item (1912–78) annotated bibliography on the Sahel's sociology and political economy. The bibliography was prepared to assist these personnel in the identification, design, implementation, and assessment of socially sound programs and projects which both benefit rural low-income Sahelian populations and are based on their needs, interests, and participation. Widely available monographic material is stressed. First, those bibliographic materials and studies which are general or regional in nature are listed, followed by alphabetical listings by country, namely: Cape Verde and Guinea-Bissau, Chad, Gambia, Mali, Mauritania, Niger, Senegal, and Upper Volta. French and English language entries are included. Periodical literature, most "social soundness analyses" prepared for A.I.D. project papers, and items produced under A.I.D. research grants and contracts are omitted, since these materials are widely distributed in the region and are easily available from the A.I.D. Research Center. The authors recommend that Missions subscribe to those journals which are rich in pertinent development material, such as *Etudes Rurales, African Environment*, and *Africa*.

AID/afr-C-1469

145 **PN-AAH-474**

AN ANNOTATED BIBLIOGRAPHY OF THE SOCIOLOGY AND POLITICAL ECONOMY OF SOMALIA, SUDAN, AND TANZANIA

Fleuret, P.; Jama, M.A.; Laitin, D.; Murdock, M.S.; Thomas, G.L.
1979, 17 p.

Development officers and contractor personnel who work with programs in Somalia, Sudan, and Tanzania can profit from using this annotated bibliography of the sociology and political economy of these countries. The bibliography was prepared to assist these personnel in the identification, design, implementation, and assessment of socially sound programs and projects of benefit to rural low-income populations. The selections are based on the needs, interests, and participation of this target group. Monographic material is stressed. The bibliography contains 62 entries arranged by country with entries in English, Italian and French. Most bibliographic items are accompanied by abstracts and cover the period 1962–79.

AID/afr-C-1504

146 **PN-AAH-530**

INDIVIDUAL, FAMILY AND VILLAGE LITERACY IN DEVELOPMENT

Nesman, E.G.; Rich, T.A.; Green, S.E.
South Florida University.
1980, 161 p.

Based on data from the Basic Village Education Project in Guatemala

Literacy has long been considered the key to the adoption of modern agricultural practices by traditional farmers. Past studies undertaken to confirm this assumption have focused solely on the individual. The purpose of this study is to expand that focus to include both the family and the village in determining the relationship between literacy and the adoption of modern agriculture practices. Data for this study were obtained from A.I.D.'s Basic Village Education Project in which 1,300 farmers and their families were profited. Major findings include the following: (1) Membership in a highly literate family is related to the increased use of modern agricultural practices — regardless of whether the farmer is literate himself. (2) The relationship between family literacy and the adoption of modern agricultural practices was not dependent upon the age of the farmer, the size of the farmer's holdings, or general living conditions. (3) Membership in a literate village is not consistently related to the use of modern agricultural practices. For example, the relationship did not hold true for farmers living in the Indian Highlands — demonstrating that the influence of literacy can be mitigated by cultural factors. (4) In contrast to family literacy, individual literacy has no measurable relationship to the increased use of modern agricultural practices. In conclusion, the current study indicated that while individual literacy has no consistent relationship to change in agricultural practices among traditional farmers, family literacy does indeed seem to be an important factor. Report includes a bibliography (58 items, 1933–78) and appendices (interview questions, scoring procedures, a

list of items comprising the agricultural practice index, a listing of materials used in the field validation study, a cross-tabulation of literacy by school attendance, and profiles of literate farmers, families, and villages).

AID/DSPE-C-0040 931000100; 520022800

147 **PN-AAH-613**

FURTHER EVIDENCE OF THE TRANSITION IN THE VALUE OF CHILDREN

Bulatao, R.A.
East-West Center, East-West Population Institute.
1979, 92 p.

In Papers of the East-West Population Institute, No. 60-B

Why are successive generations of parents having fewer and fewer children? Demographic studies have noted this transition from high to low fertility rates and are attempting to answer this question. This paper argues that a central reason for the fertility decline is a set of changes in parents' perceptions of specific values and disvalues attached to children. Children become less valuable in one sense, but they also become valued for different reasons and the burdens they impose on parents are altered both quantitatively and qualitatively. Taken collectively, these changes have been labeled "the transition in the value of children," a theory which attempts to explain long-term changes in fertility levels that accompany modernization. First, the theory and past literature, which was limited to seven Asian and two Western countries, are briefly reviewed. New evidence from countries in Africa, Latin America, Europe, Asia, and Oceania are presented in the remainder of the paper in an attempt to confirm the theory. Thus, to supplement the evidence of this transition from nine countries reported in a previous paper (Bulatao, 1979), data from an additional 14 countries are considered in this paper. Cross-national comparisons are made among values and disvalues attached to children. The new data reinforce the previous findings. Conclusions drawn were that the fertility transition is due to vanishing economic roles for children; a rise in the aspirations people have for their lives; disinterest in being financially and physically burdened by children; emergence of the conjugal family with its rewarding parent/child interactions yet marital strains; weakening cultural props for high fertility in terms of social benefits and overpopulation; and infant mortality reduction. The transition in the value of children is seen as a dual process of liberation. First, children are liberated from premature death and from having to work, and are awarded a special protected status; then, parents are liberated from the burden of caring for many children and can claim personal fulfillment as a right. Illustrative tables and a 32-item bibliography of Danish and English titles covering the years 1967–79 are appended.

AID/DSPE-C-0002 932064800

Caring for the future – a woman awaits family planning counseling in Pakistan.

148 **PN-AAG-801**

MAURITANIA: SHELTER SECTOR ASSESSMENT

Perta, J.; Fourcade, R.; Hammam, S.; Light, F.D.
1979, 176 p.

The shifting of one-third of Mauritania's population within 12 years (1965–77) from a nomadic lifestyle to one of rural/urban settlement altered the societal structure, economy, and settlement patterns. To assist the Government of Mauritania (GOM) in assessing its shelter sector, a team of consultants examined shelter population characteristics, dimensions of shelter problems, and shelter delivery system components. Recommendations to improve shelter delivery system effectiveness include: (1) removing economic constraints and encouraging system expansion; (2) improving the capabilities of shelter institutions; (3) adopting a spatial development planning policy to stabilize resettlement groups; (4) subdividing and allocating land to grant tenure to low-income families to enable them to construct permanent units; (5) avoiding high costs and family disruptions accompanying extensive relocation; (6) recapturing costs of extending public fountains systems into low-income areas; (7) designating specific refuse disposal areas; (8) promoting pit latrines for human waste disposal and self-help construction programs; (9) encouraging the production and use of local building materials; (10) mobilizing family savings directed to shelter financing; and (11) raising monthly payments on construction units to ensure that the GOM construction agency can prevent potential bankruptcy. A 64-item bibliography (1974–78) of English- and French-language titles is included, as are analyses tables.

AID/otr-C-1453 912046800
Also available in French: PN-AAG-802, 157 p.

149 **PN-AAH-119**

GUIDELINES FOR URBAN AND REGIONAL ANALYSIS: TYPES OF ANALYSES APPLICABLE TO A.I.D. ACTIVITIES

Rhoda, R.E.
United States Agency for International Development, Technical Assistance Bureau, Office of Urban Development.
1976, 110 p.

Careful analysis of the developmental context and anticipated impacts of prospective projects is essential in successful development efforts. This report describes types of urban and regional analyses relevant to A.I.D. activities. While not intended to be a "how-to" manual, the report presents guidelines to assist field missions in formulating, justifying, and designing urban and regional projects and programs. It is noted that the type and level of analysis to be implemented depend upon the country situation, development assistance strategy, and types of projects anticipated. Ten types of analyses, of varying degrees of complexity, are discussed and include those of national policies of urban and regional development; the distribution and characteristics of the poor; the distribution of development and underdevelopment; the system of central place service centers; migration; key urban-rural linkages; urban administration and the delivery of essential services; urban employment and functions; and social analysis of the urban poor. Each section provides a brief description of the type of analysis, its relevance to A.I.D. activities, typical questions addressed by the assessment, sources of data, and references (1955, 1964–66) for further information. Three applications of the analyses to project development are presented: to establish network centers for regional development; to improve the well-being of slum residents in the capital city; and to increase employment in an intermediate-sized city.

TA/UD

150 **PN-AAH-491**

KENYA SHELTER SECTOR STUDY AND A.I.D.'S EXPERIENCE

Jorgensen, N.O.
United States Agency for International Development.
1979, 247 p.

In Kenya, the need for improved rural and urban housing developments has become critical. This study, conducted in 1979 by A.I.D., examines this need in three sectors of the country and is supplemented by an evaluation of A.I.D.'s experience in urban shelter, housing finance, and rural shelter. In regard to the urban shelter sector, the authors note recent encouraging changes. Foreign donors, such as A.I.D., the World Bank, the Commonwealth Department Corporation, and the European Development Fund, have channelled more of their resources toward improving Kenya's urban housing needs. Major projects have been moved away from Nairobi to upcountry towns where they are needed. Public agencies have altered their shelter designs so that they conform more to current needs. Finally, the institutional capacity of shelter delivery agencies has been strengthened. The authors recommend that urban shelter study programs be set up immediately; that target groups for the housing agencies be clarified; that emphasis be placed upon private sector construction; and that all assistance encourage self-reliance. Within its housing finance sector, Kenya does have a good financial infrastructure and the growth of credit and saving societies has been encouraging. Also, contributions made towards voluntary support projects have been increasing. On the other hand, because the banking system has favored the urban sector, it must place more emphasis in the future on promoting rural projects. In addition, the Central Bank must extend its credit services towards housing financial institutions. The Government, which has done well in raising revenue, can increase its sources by raising revenue from import duties and income taxes. Local authorities have not done as well and their procedures for collecting property taxes and housing revenues should be reviewed. In the rural sector, Kenya has shown little interest in the past in rural development and the current development plan should help. The National Housing Corporation's rural housing loan and the role of the provincial housing officers must be strengthened. Building materials should be decontrolled and related infrastructure facilities improved. A bibliography of 27 items (1966–78) is included.

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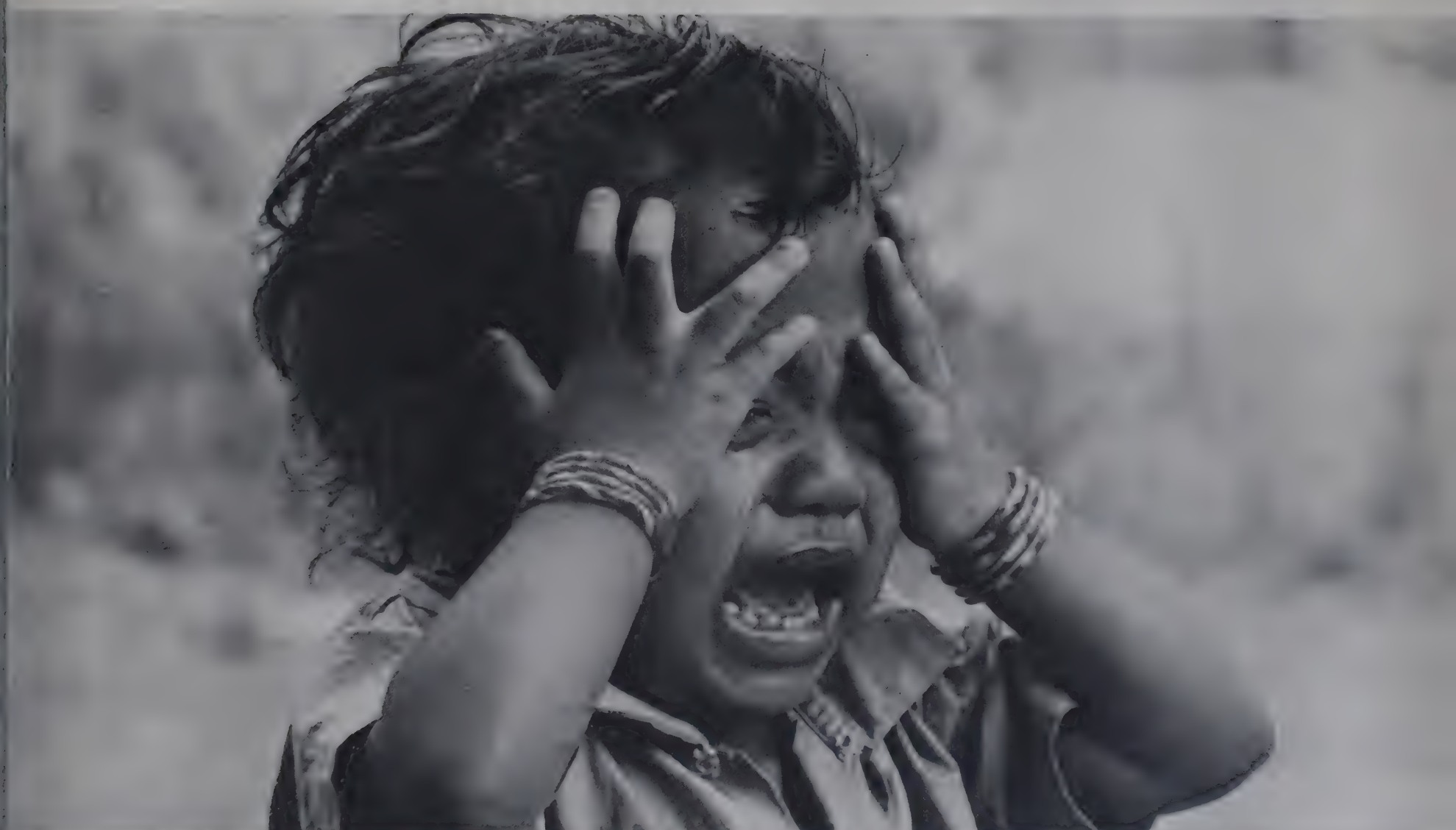

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A.I.D. RESEARCH & DEVELOPMENT ABSTRACTS

UNITED STATES AGENCY
FOR INTERNATIONAL
DEVELOPMENT (A.I.D.)

Volume 9, Number 2, July 1981
TN-AAA-032

FROM THE EDITOR

Evaluation Publications

This issue of ARDA announces a program of A.I.D. publications devoted to the evaluation of development projects and programs. Begun in 1979, the A.I.D. Evaluation Publications program is managed by the Office of Evaluation in the Bureau for Program and Policy Coordination. It reflects increased Agency concern with assessing the effectiveness and impact of its activities in attaining broad program goals, and, equally importantly, with communicating information about these assessments to those involved in designing, carrying out, and evaluating development activities. Historically, it is unusual for development donors to publish and disseminate evaluative information; it is even more unusual for donors to publish information which either confirms or critically challenges established assumptions and procedures in development programming. Through the Evaluation Publications program, A.I.D. hopes to share more widely the evaluations' findings in order to contribute to greater understanding of the development process. Announcement of these evaluation reports thus represents a new effort by the Agency and a major addition to ARDA's coverage of Agency work.

Thirty-three reports are included in this issue, under their respective subject fields. The Evaluation Publications program includes five types of reports. The first, *Program Evaluation Discussion Papers*, are commissioned to explore issues, critically examine assumptions and practices, and summarize documented experience. The second, *Project Impact Evaluation Reports*, assess the intended or unintended impacts of completed projects or related projects. Impact evaluations focus on priority areas selected by Agency executives and are prepared by teams composed entirely or predominantly of Agency staff members unassociated with the particular project(s) or with the country Mission. The third, *Program Evaluation Reports*, consolidate and synthesize evaluative information in the context of an overall program, sector, or type of development activity. The fourth, *Evaluation Special Studies*, include occasional papers that record unique or valuable instances of the Agency's development experience or that address design and evaluation issues in new types of projects. The fifth, *Program Design and Evaluation Methods*, present the results of Agency work in developing methodologies, research designs, and data collection and analysis strategies that support the design and evaluation of development programs.

Abstracts of new publications will continue to be included in future issues of ARDA.

Descriptions of individual evaluations are located under the following item numbers:

Program Evaluation Discussion Papers 010, 020, 021, 049 051, 105, 129, 143, 149
Project Impact Evaluation Reports 004, 008, 014, 015, 019 052, 053, 106, 109, 110, 120, 144-148, 150
Program Evaluation Reports 022, 132, 134
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Program Design and Evaluation Methods 043

Environment and Natural Resources

In recent years, our environment has increasingly become the subject of both scientific study and passionate, public debate. The overwhelmingly, carefully documented fact is that our environment is everywhere degraded. Language is strained to describe this degradation and its long-term consequences for human life.

It is impossible to fully grasp the depth of the biosphere's restorative resiliency when protected from environmental insult, and difficult to simply accept how truly little we know of both the destructive and restorative processes. We blithely ascribe cause and effect concerning the destruction, but fail to reduce its pace. As a sobering example of modern man's ability to change the natural environment at unprecedented rates, consider that: more than a billion years ago, significant amounts of oxygen began to appear in the earth's atmosphere; no more than 4 million years ago, the first humans appeared; yet during only the last 100 years, atmospheric carbon dioxide increased 15% worldwide and may double before the middle of the next century — largely as the result of man's burning of fossil fuels. Since oxygen is the *sine qua non* of life as we know it, such increases in concentrations of carbon dioxide are ominous.

Nature, when left to itself, maintains a proper balance between oxygen and carbon dioxide through photosynthesis in marine and land vegetation. For centuries, however, human beings have used the oceans — which generate one-half of the world's oxygen — as a giant sewer, dumping refuse as though it ceased to be a problem when it disappeared from view. Only now are we beginning to understand how this pollution of the oceans threatens the delicate web of life. The widespread degradation of the world's forests in this century intensifies this threat to truly alarming proportions. For example, tropical forests, which constitute the earth's richest ecosystem, are being destroyed at the rate of 49 million acres a year. Such destruction is roughly equivalent to annually denuding the nations of Nicaragua and Costa Rica or the combined area of the states of Maryland, Virginia, and West Virginia in the United States.

A grim picture of the current state of the environment emerges from a close examination of the documents in this issue's section on Environment and Natural Resources. Announced in this section are 26 draft reports on the state of the environment in individual countries throughout the world. Produced by the United States Man and the Biosphere Program (MAB) and funded by A.I.D., this collection of environmental reports describes each country's natural resources base, its environmental problems, and the measures being taken to manage those problems. Subsequent issues of ARDA will include future reports as they become available. Besides these reports, which offer a rich source of comparative information to help solve practical problems, the U.S. MAB program provides research and training to study human interactions with the natural environment, and extends its experience and integrative approach in resolving specific resource management problems.

Also announced in this section are 17 additional studies on critical issues in forestry, fuelwood, other renewable energies, and related topics. Included are descriptions of conferences on deforestation

(continued on back inside cover

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Acting Senior Assistant Administrator ..... CURTIS FARRAR
Director, Office of Development Information and Utilization ..... LIDA L. ALLEN
Chief, Division of Documentation and Information ..... DAVID G. DONOVAN

SUBJECTS AND DOCUMENTS OF SPECIAL CURRENT A.I.D. INTEREST

DOCUMENTS OF SPECIAL INTEREST IN THIS ISSUE OF ARDA: **ITEM NO.**

Aiding the Environment: A Study of the Environmental Policies, Procedures and Performance of the U.S. Agency for International Development 094

Directory of Selected U.S. Training Programs, Short Courses and Workshops in Environmental Protection and Natural Resource Management: A Survey of Programs for the Agency of International Development and the United States Man and the Biosphere Program 103

Firewood Crops: Shrub and Tree Species for Energy Production 104

Forestry Activities and Deforestation Problems in Developing Countries 099

Health Sector Policy Paper 108

Oral Fluid Therapy in Diarrhea and Dehydration: Current Concepts and Practical Considerations 112

Oral Rehydration Therapy: An Annotated Bibliography 111

Perspectives in Maternal-Infant Nutrition 119

Population: Current Status and Policy Options 122

Preliminary Guide to Audiovisual Materials on Environmental and Natural Resource Issues in Developing Countries: A Survey for the U.S. Agency for International Development/Man and the Biosphere Program 102

Proceedings of the U.S. Strategy Conference on Tropical Deforestation, Washington, D.C., 1978 090

Reaching the Rural Poor: Indigenous Health Practitioners Are There Already 105

Republique Unie du Cameroun Enquete Nationale sur la Nutrition: Rapport Final 117

Rice Improvement in China and Other Asian Countries; Proceedings of the First International Rice Research Workshop, Guangzhou, China, 1979 037

Solar Energy Domestic Policy Review, International Panel Review of Existing Federal Programs 141

The World's Tropical Forests: A Policy, Strategy, and Program for the United States: Report to the President 098

SERIES INCLUDED IN THIS ISSUE:

A.I.D. Evaluation Special Studies 018, 062, 114

A.I.D. Program Design and Evaluation Methods 043

A.I.D. Program Evaluation Discussion Papers 010, 020, 021, 049 051, 105, 129, 143, 149

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DOCUMENTS AVAILABLE IN FOREIGN LANGUAGES

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QUESTIONS AND ANSWERS ABOUT ARDA

What is ARDA?

ARDA, "A.I.D. Research and Development Abstracts", is a quarterly abstract journal issued by the Division of Documentation and Information, Office of Development Information and Utilization, Bureau for Science and Technology.

What is the goal of ARDA?

The goal of ARDA is to transfer development and technical information to active practitioners in development assistance.

For whom is ARDA published?

ARDA's target audience is A.I.D. staff worldwide and selected key institutions in developing countries. Such institutions are government agencies, universities, libraries, research organizations, and other public and private sector organizations.

What materials are abstracted in ARDA?

ARDA presents abstracts of A.I.D.-funded current and less recent research studies, state-of-the-art reports, sector analyses, special evaluations, and other documents which, taken together, describe a broad spectrum of international development experience.

Who receives ARDA?

All major A.I.D. offices in AID/W and in the field receive ARDA regularly and automatically, along with other information outputs.

Developing country recipients who have completed the "ARDA Questionnaire" signifying their interest in the receipt of ARDA and other information outputs receive ARDA regularly. (USAID Missions are encouraged to ask counterpart institutions to write to the Editor of ARDA for the questionnaire or to send the names and addresses of such institutions to the Editor of ARDA. Peace Corps Volunteers may also ask the counterpart institutions in which they work to write for the questionnaire.)

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How are ARDA publications ordered?

Send the completed order forms to:

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AID/W staff and USAID Missions may order an unlimited number of materials at no cost in either paper or microfiche. Only A.I.D. staff may order paper copies of documents more than 300 pages long.

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What formats are available for full texts?

Most titles included in ARDA may be acquired in paper copy. All titles are available, however, on negative diazo microfiche.

All USAID missions and developing country institutions with access to microfiche readers with 24x magnification should order documents on microfiche.

USAID missions can build up complete microfiche libraries of A.I.D. publications by either subject classification or by geographic region. Missions desiring more information on documents available to them on microfiche or on microfiche equipment should write to the Editor of ARDA.

To whom do I address additional questions regarding ARDA?

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QUESTIONS ET REPONSES RELATIVE À ARDA

Qu'est-ce qu'ARDA?

ARDA, "A.I.D. Research and Development Abstracts" (Résumés sur la recherche et la développement de l'Agence pour le Développement International), est une revue trimestrielle composée de résumés publiée par la Division de la Documentation et des Informations, Bureau des Informations sur le Développement et leur Utilisation, Bureau pour Science et Technologie.

Quel est l'objectif d'ARDA?

ARDA cherche à transmettre les informations techniques et axées sur le développement aux techniciens participant à l'assistance au développement.

A qui s'adresse ARDA?

ARDA s'adresse au personnel d'A.I.D. dans le monde entier et aux institutions clés choisies, situées dans les pays en développement. Des institutions de ce genre sont des organismes publics, des universités, des bibliothèques, des organisations de recherche, et autres organisations des secteurs public et privé.

Que contiennent les résumés d'ARDA?

ARDA présente des résumés d'études actuelles et moins recentes relatives à la recherche et financés par A.I.D., des rapports faisant le point des connaisances actuelles, des analyses sectorielles, des évaluations particulieres, et d'autres documents qui, ensemble, décrivent un large évantail de réalisation dans le domaine du développement international.

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Tous les principaux bureaux d'A.I.D. dans le monde entier reçoivent ARDA, régulièrement et d'office, en même temps que d'autres rapports d'information.

Les destinataires qui résident dans les pays en développement et qui ont rempli le "Questionnaire d'ARDA" prouvant ainsi leur désir de recevoir ARDA et d'autres rapports d'information les reçoivent régulièrement. (On incite les missions de l'USAID à demander aux institutions homologues d'écrire au rédacteur d'ARDA pour se faire envoyer le questionnaire ou de faire parvenir les noms et adresses des institutions en question au rédacteur d'ARDA. Les voluntaires de Peace Corps peuvent également demander aux institutions homologues où ils travaillent d'écrire pour demander le questionnaire.)

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¿Cuál es el objectivo de ARDA?

El objectivo de ARDA es el de transmitir información técnica y de desarrollo a trabajadores activos en asistencia de desarrollo.

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La audiencia blanco de ARDA consta de los funcionarios de A.I.D. en el mundo entero y de los instituciones claves seleccionadas en los países en desarrollo. Tales instituciones son agencias de gobierno, universidades, bibliotecas, organizaciones de investigación y otras organizaciones del sector público y privado.

¿Qué materiales son condensados en ARDA?

ARDA presenta extractes de estudios de investigación corrientes y menos recientes consolidados por A.I.D., informes del estado del arte, análisises del sector, evaluaciones especiales, y otros documentos que, juntos, describan un espectro ántlio de experiencia de desarrollo internacional.

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SAMPLE DOCUMENT CITATION AND ABSTRACT

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Numéro de l'article
Numero de articulo

133

Publication number
Numéro de la publication
Número de publicación

PN-AAH-900

A REFERENCE COMPILATION OF SCIENCE AND TECHNOLOGY OFFICIAL DEVELOPMENT ASSISTANCE FURNISHED BY A.I.D. FOR THE LESS DEVELOPED COUNTRIES (LDCs)

Title
Titre
Titulo

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Logical Technical Services Corporation.

Document date and page numbers
Date et nombre de pages du document
Fecha y número de páginas del documento

1980, 88 p.

Prepared for the United Nations Conference on Science and Technology for Development

Supplementary note
Nota supplémentaire
Nota suplementaria

Abstract
Résumé
Sumario

This research report, summarizing official development assistance provided by A.I.D. to LDCs, was produced to meet the needs of participants in the United Nations Conference on Science and Technology for Development. It represents a synthesis of A.I.D.'s economic assistance philosophy, which is characterized by a two-fold thrust: (1) a "basic human needs" approach to bilateral development assistance, which combines the furthering of U.S. interests abroad with U.S. humanitarian interest in that quarter of the world's population condemned to live at a substandard level; and (2) a refocussing of A.I.D.'s assistance to LDCs from sophisticated technology to light capital, labor-intensive applications of scientific and technological developments. The report concentrates on development assistance in the fields of health, nutrition, and population; energy and natural resources; employment, trade and industrialization, and access to technology; food, climate, soil, and water; and urbanization, transportation, and communication. In each case, the relevant technologies and means of technology transfer are discussed in conjunction with a statement of the development problem addressed by these technologies and with illustrative examples of A.I.D. programs. The report concludes that comparatively little U.S. technology can be transferred to LDCs without significant adaptation. The LDCs have become aware of the need for technologies tailored to fit their resource endowments and absorptive capacities, and stress is being placed on the development of more appropriate technologies as well as on devising policies and institutions permitting LDCs to make better technological choices. An extensive subject index is included in this report.

Project number
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Número de proyecto

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001 **PN-AAH-351**

PROFILES OF BASOTHO FARMERS

Wilken, G.C.; Fowler, M.H.
Colorado State University, Department of Economics.
1979, 57 p.

LASA Discussion Paper No. 8

Understanding the complex characteristics of Basotho farmers — who are resilient but who also resist introduction of new crops, tools, or techniques — is necessary if development planning for Lesotho's agricultural sector is to be effective. This report characterizes Basotho farmers through three essays entitled "Images of Basotho Farmers", "Are the Basotho Subsistence Farmers?", and "Progressive Farmers in Lesotho". All three studies elucidate the relationship between previous assumptions and present policy. The first essay notes that a confused image arises from literary characterizations as early as the 1830's. Evaluations of Basotho farmers vary from one period to another, revealing a strong cultural bias toward farmers' motivations and abilities. Some authors, for example, believe that Lesotho is an agrarian society composed of nonfarmers and indifferent pastoralists who produced great surpluses in the past but who are now incapable of self-subsistence; others claim they are not agriculturalists by tradition and make poor use of their natural resources. The second study concludes that despite the similarity of Basotho farmers to subsistence farmers elsewhere, typical subsistence farmer behavior models would not work well, if at all, in Lesotho — principally because of the pervasive opportunity for off-farm employment and its resulting income that characterize the Basotho farm and home economy. Recommendations are made for further preliminary studies of the environmental and social factors affecting production. The third essay cautions against employing progressive and initially attractive farming schemes to solve Lesotho's agricultural production problems. Such schemes distribute already scarce resources to the select few able to afford the new technology. In any case, it is uncertain that these programs can effectively disseminate new methods or produce widespread benefits in the agricultural sector. Indeed, they may create social disparity and thus impede agricultural development. Reliance on the inherent hardiness of the Basotho farmer and his highly developed local institutions represents a sounder basis for future sector development. An 81-item reference list (1861–1979) is appended.

AID/ta-BMA-6; AID/ta-CA-1 632006400

002 **PN-AAH-492**

THE "ELEUSINES": A REVIEW OF THE WORLD LITERATURE

Rachie, K.O.; Peters, L.V.
International Crops Research Institute for the Semi-Arid Tropics (ICRISAT).
1977, 187 p.

The Eleusines are practically unknown outside southern Asia and eastern Africa. Yet, *Eleusine coracana*, or finger millet, is a food source for millions of people in this region, indicating the important role it plays not only in nutrition, but also in the farming systems in the semiarid tropics. To increase the awareness of agriculturalists worldwide of the value of finger millet or ragi, this report reviews world literature on the characteristics, cultivation, and nutritional value of this crop. After an analysis of the morphology, cytology, and genetics of ragi, breeding techniques for ragi are examined, along with breeding incentives and constraints such as mating and stand establishment difficulties. A study of ragi cultivation by country shows that although it is adaptable to many soil types and high elevations, it is seldom grown on a large scale due to high labor requirements and the lack of nitrogen, one of the soil nutrients needed for cultivation. Ragi, normally grown by peasants, is usually fertilized not with expensive chemical agents, but with farmyard manure. Other aspects of ragi cultivation examined include land preparation, mineral content, and the effects of soil salinity. The authors recommend investigating the environmental conditions predisposing the development of the most important diseases affecting ragi — blasts and blights — and breeding varietal resistance to the pathogens causing these diseases. Ragi's resistance to storage pathogens and pests and its ability to maintain its viability when stored in hot, humid areas make it an excellent storage grain. Moreover, under intensive cultivation, ragi produces high yields, has high nutritive value, and enjoys relative freedom from pests and diseases. An evaluation of the protein, mineral, and vitamin content in ragi and its uses when processed into flour and malt is included. In conclusion, there is great potential for meeting future nutritional needs through the improved and increased production of ragi, but this will require intensified research and improved management programs. A total of 12 brief technical appendices and a 405-item bibliography (1886–1975) of English, French, Italian, German, and Russian references is appended.

AID/ta-G-1421 931097200

003 **PN-AAH-529**

CATALOG OF HOLDINGS AND OTHER REFERENCES IN THE LESOTHO MOA/LASA LIBRARY

Wilken, G.C.; Leballo, M.J.; Eckert, B.J.; Motleleng, M.; Bolls, K.J.
Colorado State University, Department of Economics.
1979, 377 p.

LASA Research Report No. 5

In 1978 the Lesotho Agricultural Sector Analysis (LASA) project team compiled a bibliography listing reference materials on agricultural planning and development in Lesotho which were held in collections in the United States, Europe, and Africa. Since that time, the acquisition efforts of the LASA project team have focused on obtaining materials from Lesotho, such as national and ministerial documents and technical and statistical reports, as well as project papers, data analyses, and related consultant reports reflecting indigenous research and development activities. This second bibliography represents the collection of the LASA library, which has recently merged with that of Lesotho's Ministry of Agriculture. This combined collection contains the most complete and accessible agricultural and development planning materials and

project documents in Lesotho. The bibliography contains nearly 3,000 entries (1841–1979) of English, Italian, Sesuto, German, French, and Spanish publications, and is organized into the following subject categories: geography and natural resources; agriculture; agricultural marketing; industry and commerce; population, employment, and migration; education, training, and extension; health and nutrition; society, culture, and the political process; Lesotho planning and development assistance; and theory and methodology. A final category lists other bibliographies, catalogues, government guides, surveys, and reports. Each entry carries conventional author, title, and publication information, as well as the library at which the document is held. The final section of the bibliography contains an alphabetical index of authors which refers the reader to the subject category entry for complete information.

AID/ta-BMA-6; AID/ta-CA-1

004 **PN-AAH-723**

KITALE MAIZE: THE LIMITS OF SUCCESS

Johnson, C.W.; Byergo, K.M.; Fleuret, P.; Simmons, E.; Wasserman, G.

U.S. Agency for International Development.
1979, 62 p.

A.I.D. Project Impact Evaluation Report No. 2

Ninety percent of Kenya's people depend on maize as their staple food. This report examines the impact of A.I.D.'s support to maize breeding projects in Kenya, which aimed to make regular improvements in hybrid maize through development of a breeding methodology and to create an institutional capacity in East Africa for maize research. The evaluation is particularly concerned with the spread of improved hybrid technology and its impact on economic growth, equity, and government policy. Most of the breeding program for high potential areas was a success — yields improved by 25% under research station conditions and, by 1972, the new maize seed had increased yields by one million tons. The private sector was crucial in the rapid diffusion of hybrid maize specifically adapted to the different regional climates. The new seed was of greatest value to those farmers with sufficient land, labor, and capital to fully utilize the innovation, but it also allowed numerous smallholders to improve their food security. The projects' successes, however, were limited by their concurrent failures. The majority of the poor did not participate in achieving the high yields made possible by the improved technology. Research to improve maize protein quality and to develop varieties in low rainfall areas was not successful; neither were efforts to create a regional maize research capacity. The Government of Kenya failed to adjust pricing and marketing systems to problems of abundance and did not insure availability of critical inputs, e.g., fertilizer and credit. Even more importantly, the planned development of an indigenous, ongoing maize research capacity, including training aspects, did not occur. It was learned that the simplicity and viability of the hybrid seed contributed most to its success; equity cannot be expected to arise from technological improvements; and the long-term continuity of foreign experts, which ensured the breeding program's success, did not allow institutionalization of the research capability. An 118-item bibliography (1963–79) is appended.

698017600; 618065200; 618065700; 615018000

005 **PN-AAH-858**

METHODS OF REDUCING POSTHARVEST LOSSES OF ROOTS, TUBERS, FRUITS, AND VEGETABLES IN DEVELOPING COUNTRY ECONOMIES

Morris, R.F.
1978, 17 p.

The goal of appropriate food technology is to preserve, process, and store food cost-effectively and with minimal loss of produce due to needless and preventable spoilage. This report focuses on various storage and processing interventions designed to improve the postharvest production of fruits, roots, tubers, and vegetables. Of crucial importance to the shelf life and quality of produce are the temperature, relative humidity, gas concentrations, ventilation, and absence of light in the storage environment. Although refrigeration reduces spoilage of perishable produce, the dual need for equipment maintenance and a continuous power supply frequently limits its applicability in developing countries. Less expensive cooling systems and mechanical devices need to be developed such as those using freon, ammonia, or water. Evaporative cooling regulates humidity to prevent shriveling, a substantial problem in arid areas. Atmospheric gas alteration (AGA), also known as controlled atmosphere storage, places produce in an environment with air of different proportions of nitrogen, oxygen, and carbon dioxide. While AGA increases off-season fruit availability, fruit thus stored must be of higher quality than that stored in air to be cost-effective. An example of AGA preservation is the wrapping of bananas in semipermeable plastic film to trap carbon dioxide. Effective produce preservation also requires proper physical spacing and ventilation while in storage to combat fungal disease incidence. The pit storage method covers cured roots and tubers with dirt to maintain sufficient humidity and to shield the produce from the sun. Processing methods most applicable to LDCs' needs and of the greatest potential impact are easily implemented and are either low in cost or labor intensive. Examples include fermentation, drying, dehydration, heat processing or canning, and chemical treatment. The report proposes further study of canning and fermentation processes. Attention should also be given to such vital factors as transportation, packaging (perhaps the cheapest method of minimizing produce losses), postharvest system analyses, and personnel training to ensure problem awareness. Four reference items (1970–78) are included.

AID/ta-C-147-614 931115500

006 **PN-AAH-859**

FRUIT, VEGETABLES, ROOTS AND TUBERS IN THE DEVELOPING ECONOMIES: AN ESTIMATION OF LOSSES

Morris, R.F.
1978, 15 p.

Because they spoil easily, fruits, vegetables, roots, and tubers, which number over 1,000 species throughout the world, are called "perishables." In this report, damages occurring to perishables and the problems of estimating the associated losses are discussed. Damage to perishables results in weight loss causing decreased flavor, nutritional value, appearance and, since perishables are commonly sold by weight, in lower market value. This damage may be physiological, pathological, or physical. Physiologically, since plants continue respiring after harvest, the speed with which the metabolic process of respiration converts starches to carbon dioxide and water vapor determines how fast perishables lose weight during storage. For example, roots and tubers respire slowly after harvest and lose only 2–5% of their weight per month while snap beans may lose 83% of their weight in only 5 days. The temperature and oxygen supply in storage facilities also determine how long perishables will remain edible. Pathological elements (i.e., fungi and bacteria), the most serious cause of post-harvest damage, usually harm plants after previous physiological or physical damage has taken place. Initial infection by a specific pathogen followed by massive attack by weak pathogens is the normal pattern. Losses from physical damage are due to the high water content which predisposes produce to bruising when bumped or dropped. This type of damage is common in LDC's where food handling techniques are poor. Damage from insects and rodents is significant, but not as harmful as the above factors. The reliability of data on damage losses is often questionable for several reasons. Data are frequently valid only for one commodity under one set of conditions. The extent of produce loss within a short time after harvest also varies widely. Finally, loss estimates are frequently misinterpreted when the parameters used for measurement are not clearly defined and the numerical data obtained is too detailed to be reliable. Even at a conservative estimate, however, some 25% of perishables produced are lost annually, indicating a need for effective international action. A 16-item bibliography (1960–78) is attached.

AID/ta-C-147-614 931115500

007 **PN-AAH-922**

QUANTITATIVE ANALYSES OF LESOTHO'S OFFICIAL YIELD DATA FOR MAIZE AND SORGHUM

Eckert, J.
Colorado State University, Department of Economics.
1980, 35 p.

LASA Research Report No. 8

Crop yield estimates computed by Lesotho's Bureau of Statistics have undergone considerable scrutiny recently. The Bureau's data seem unreliable, showing a long-term decline in yields, a high degree of variability both within each year and between districts, and, in 1976/77, a jump of more than 50% over earlier averages. Climate fluctuation, however, heavily influences cropping patterns in Lesotho and may account for these anomalies. This paper analyzes, at the macro-data level, the relationships between crop yields and rainfall in Lesotho and develops mathematical equations to estimate maize and sorghum crop yields. Equally importantly, it tests the validity of Lesotho's official crop yield statistics. Multiple linear regression, run on 39 of 59 selected recorded yield averages, was applied to determine the relationship between yield levels and monthly rainfall totals. Illustrating his conclusions with charts and mathematical equations, the author quantifies yield relationships for maize and sorghum; analyzes the accuracy of his equations and the variability in official statistics; discusses yield discontinuities, such as that for 1949/50 and 1976; and determines the applicability of the equations in predicting crop yields. The results suggest that Lesotho's maize and sorghum yield figures are highly reliable and that their variation reflects actual agronomic and environmental determinants; proceeding with other analyses based on these data now appears warranted. Because the equations accurately model existing data, estimates are calculated for the early 1970's when no official statistics were collected. With the help of the equations presented, government officials can make pre-harvest predictions of crop yields and can formulate better policy decisions on such issues as food imports, food aid negotiations, inter-district food movements, and strategic food reserves. A 14-item reference list (1952–80), as well as two appendices explaining the use of "dummy variables" in the equations and discussing the methodology used in estimating 1976 crop yields, are appended.

AID/ta-BMA-6; AID/ta-C-1 632006400

008 **PN-AAH-977**

CENTRAL AMERICA: SMALL-FARMER CROPPING SYSTEMS

Hobgood, H.H.; Bazan, R.; Ehrick, R.; Escobar, F.; Johnson, T.; Lindenberg, M.
U.S. Agency for International Development.
1980, 111 p.

A.I.D. Project Impact Evaluation Report No. 14

Rural development strategies have increasingly focused on extending modern production technology to improve the low yields of small farmers who produce most of the world's food crops. This report evaluates a research project to increase small-farmer production in Central America by developing improved cropping practices. The Small Farmer Cropping Systems Project (SFCS) supported research by the Center for Tropical Agricultural Research and Training (CATIE) in Costa Rica on the traditional multicropping systems used by over 4 million small farmers in Costa Rica, Nicaragua, Honduras, El Salvador, and Guatemala. Although progress was slow in El Salvador and Guatemala, the project succeeded in implementing on-farm research and developing area-specific recommendations. The major shortcoming of the 5-year project was that it concentrated on the research process itself rather than on verifying and disseminating results

Farmer impact was thus limited to the 75 small farmers on whose farms research was conducted. Farmers in Nicaragua and Guatemala were active participants, whereas those in Costa Rica and Honduras remained largely ignorant of the project and disinterested in adopting alternative systems. Test farm yields increased in every country but Guatemala. CATIE's staff, training, and support capabilities were greatly improved and most national agricultural institutions involved were positively impacted. The team concluded that SFCS is a replicable model capable of significantly improving the lot of the small farmer. Recommendations for future projects are: (1) include dissemination of research results; (2) stress an interdisciplinary approach; (3) seek the active participation of farmers; (4) improve SFCS methodology by upgrading farm selection criteria, clarifying the relationship between on-farm and central station experiments, and increasing attention to the non-agronomic aspects of small farm systems; (5) promote maximum interagency collaboration; and (6) shorten the time lag between research, verification, and dissemination. Appendices on evaluation methodology, project impact on CATIE, and CATIE's production data are included, as are reports on Nicaragua, Guatemala, Honduras, and Costa Rica.

596006400

009 **PN-AAJ-140**

INTERCROPPING WITH CASSAVA: PROCEEDINGS OF AN INTERNATIONAL WORKSHOP HELD AT TRIVANDRUM, INDIA, 1978

International Development Research Centre (IDRC); Central Tuber Crops Research Institute.
1979, 142 p.

IDRC-142e

Although as much as 50% of all cassava is produced in small farm, multiple cropping systems, most cassava research has been monocrop oriented. This report presents the proceedings of a workshop, jointly sponsored by the International Development Research Centre and the Indian Central Tuber Crops Research Institute (CTCRI), on the problems and benefits of intercropping with cassava. Researchers and policymakers from four international and six national research centers were invited to participate. After 2 days of field visits to CTCRI's central and farm research sites and to a cassava processing plant, 14 papers were presented on research efforts in Brazil, India, Indonesia, Malaysia, Central America, Africa, and Thailand. Topics covered included the implications of cassava intercropping for soil fertility, agroclimatic and biological interactions, agronomics, agroeconomics, and crop protection. Finally, participants reviewed research methodologies and established guidelines for future research on intercropping with cassava. The authors conclude that further research is needed on the effects of regional drought stress on productivity; the type and timing of bean planting with cassava; intercrop disease dynamics; analytical techniques for using variability and cropping pattern data; multiple cropping effects on stability; and the economic impact of intercropping with cassava. Increased attention should be given to the following issues: (1) the effect of greater production in lowering the market price for cassava producers; (2) the tendency of intercropped cassava to develop large roots which lessen its marketability; (3) the need to compensate for cassava's high potassium demand by intercropping with low potassium demand plants or altering the fertilizer regime; (4) the potential for intercropping at a later stage in cassava's growth and simultaneously harvesting both crops; (5) the need to involve farmers in the design and evaluation of on-farm research; (6) the need to orient cassava research toward the poorest third of the farmers; and (7) the need to improve evaluative methodologies. A 179-item bibliography (1935–79) and a list of workshop participants are appended.

AID/ta-G-1406 931078600

010 **PN-AAG-691**

POLICY DIRECTIONS FOR RURAL WATER SUPPLY IN DEVELOPING COUNTRIES

Burton, I.
A.I.D., Bureau for Program and Policy Coordination, Office of Evaluation.
1979, 54 p.

A.I.D. Program Evaluation Discussion Paper No. 4

In order to provide an adequate potable water supply for every individual in developing countries by 1990, greatly increased efforts have been slated by donor agencies during the International Drinking Water Decade (1980–90). To be effective, however, these increased efforts must improve on previous water projects, which have had a high failure rate. This paper examines problems associated with rural water supply programs and recommends changes in policy directions. The author briefly reviews the history of water assistance projects and the priority accorded them by donors and host countries and lists recent evaluations conducted by international and bilateral donors. The many maintenance-related problems which are most commonly responsible for failures in water supply projects are discussed. In general, the lack of spare parts and other supplies, coupled with insufficient national program support (often reinforced by donor emphasis on construction, rather than maintenance), leads to equipment breakdown or misuse, and not the technology itself. Lack of coordination among the myriad of donors and consultants leads to further confusion and inefficiency. Lastly, villagers are often unaware or misinformed about the benefits of potable water — they tend to value taste or convenience over safety. Project planners often ignore the social/religious value placed on water by the community, which can lead to a lack of local motivation to maintain and use the new systems. To ensure the effectiveness of future programs, the author recommends that A.I.D.: (1) choose appropriate technology which is cost-effective and easily maintained; (2) increase donor collaboration; (3) improve the manpower, administration, and commitment of host governments to national water programs; and (4) increase community participation and education related to local water projects. The author especially recommends a shift in emphasis from the planning of individual projects to a national or sector approach in which institutional building activities as well as

hardware are funded. A list of practical steps to achieving these policy shifts is presented. A 14-item bibliography (1975–78) and an appendix on problem dimensions are attached.

930008500

011 PN-AAG-841

PROPOSED WATER MANAGEMENT PROGRAM FOR MAJOR IRRIGATION SCHEMES IN SRI LANKA

Lance, E.; Willsie, R.; Moore, M.; Hagood, M.; Kemper, D.
CH2M Hill, Inc.
1979, 285 p.

Because of poor irrigation management, much of Sri Lanka's agricultural lands can be farmed only occasionally or only during the Maha season — despite the fact that sufficient rainfall exists for one or more crops per year. The purpose of this study is to determine the institutional, organizational, and physical components of a proposed A.I.D. irrigation program in Sri Lanka. The country's water management problems are primarily due to poor maintenance and a lack of control over water use. Insufficient attention is given to operational requirements, and budgeting for maintenance is inadequate. Scarce government resources are often used for new construction rather than for maintenance. Water is taken at will by area farmers, and relationships between farmers and government agencies are not good. Furthermore, water management personnel are poorly trained and are not given the authority and support they need to enforce water rationing. A.I.D. has proposed a program which includes upgrading of the Walawe and Gal Oya irrigation schemes, improved water management training and extension programs, increased cooperation from the Irrigation Department, and funding of a social research program. The Irrigation Department's Water Management Division would be strengthened — its staff enlarged and trained, and the Division placed under the authority of a deputy director who would have no other responsibilities. Other steps would include: (1) revision of criteria used to select technical assistance recruits, i.e., placing less weight on academics and more weight on numeracy tests and human relations; (2) greater coordination of programs and plans by the Department of Agrarian Services, Agriculture, and Irrigation; and (3) a willingness to prosecute for damages in order to restore discipline to irrigation projects. Finally, the proposed A.I.D. project is evaluated for technical, social, economic, financial, administrative, and environmental soundness. Appendices include descriptions of the Irrigation Department's organizational structure and work program, local level governments, farmer organizations, and the Uda Walawe and Gal Oya projects, and a cost breakdown of the proposed A.I.D. program.

AID/otr-C-1618 498024900

012 PN-AAH-575

POTABLE WATER SUPPLY IN RURAL MOROCCO

Dajani, J.S.
1979, 23 p.

The shortage of potable water supplies in Morocco has been the target of an extensive project to rehabilitate 400 rural wells in eight provinces. After assessing the project's technical feasibility, the author of this report concludes that such a vast project, besides being difficult to manage, would be too diffuse to show any tangible improvements. He proposes instead that extensive efforts to rehabilitate wells be undertaken in one, or at most two, provinces; and he provides a model for such a scaled-down effort. The selection of Ouerzazate, the province to serve as the model's site, was based on its poor water supply statistics (87.8% of the households have no water source), the poor condition of existing wells, adverse climatic conditions, and the fact that the Peace Corps has already laid the groundwork for rehabilitating wells in this area. A preliminary site survey established the existence of 100 public wells and 40 other types of public water sources and found that the province's residents often bypassed these wells, which contain chlorinated water, in order to obtain better tasting, but obviously dirtier water, from poor quality wells. The following work plan for the proposed project revision is suggested: (1) setting priorities for selecting target communities; (2) assessing the target communities' water supplies; (3) defining specific water source improvements, as well as identifying skilled laborers; (4) determining if existing sanitation conditions need improvement; (5) educating the community about hygiene and water source maintenance; and (6) conducting follow-up visits to each community. Emphasis is placed on the need to combine water source improvements with upgrading waste disposal practices and to keep the project's administrative structure as simple as possible. The inputs required by the Peace Corps and the host government are detailed, as are budgetary and administrative needs. Finally, it is suggested that a team of U.S. volunteers and Moroccan officials initiate planning and surveying activities in the province of Marrakech in view of a possible adoption and adaptation of the proposed model in that province. Detailed figures and tables are located throughout the report.

AID/ne-C-1575 298003500

013 PN-AAH-668

IRRIGATED AGRICULTURE IN AFGHANISTAN

Experience, Inc.
1978, 134 p.

Agriculture in Afghanistan, particularly small-farmer agriculture, is hampered by inadequate irrigation systems and inappropriate use of water and land resources. This study identifies three main problem areas inhibiting development of irrigated agriculture in Afghanistan and proposes possible solutions. Failure to effectively inventory and exploit resources and lack of adequate conveyance systems limit available irrigation supplies, the use of which is further constrained by the reluctance or inability of farmers to

adopt irrigation practices. Several solutions proposed for this resource problem are to: (1) establish a National Water Resources Committee (NWRC) responsible for the review of all proposed projects; (2) develop groundwater resources by drilling wells and by artificially introducing water; (3) undertake a comprehensive soil inventory and description; (4) conduct a soil/water conservation program for irrigated catchment areas; and (5) construct surface water storage reservoirs. The problem of conveyance system inadequacies can be lessened by construction of new river diversions and consolidation of existing ones; introduction of supply pumps; and reductions in the amount of water needlessly lost — over 65% of the total supply — through seepage, inadequate system design, evapotranspiration, and insufficient flood protection. The lack of appropriate farm infrastructure and farmer acceptance constitutes the final problem area. Suggested solutions are: (1) increasing farmer knowledge of modern farming methods and enforcing application of efficient water-use practices; (2) improving on-farm water distribution and drainage systems; (3) increasing soil reclamation activities and introducing farming practices more conducive to efficient soil and water use (intercropping, proper seeding, etc.); and (4) maximizing the use of rainfall and other runoff irrigation by the use of impoundments. A series of technical packages to deliver necessary inputs and implement some of the proposed solutions is presented. Included are five appendices on the use of groundwater and recharge, the potential impact of technology, the role of soils, the NWRC, the report's study methodology, and survey discussion notes.

AID/afr-C-1130 GTS 298035300

014 **PN-AAH-724**

KENYA RURAL WATER SUPPLY: PROGRAMS, PROGRESS, PROSPECTS

Dworkin, D.

U.S. Agency for International Development.
1980, 45 p.

A.I.D. Project Impact Evaluation Report No. 5

Despite high levels of investment, Kenya's 10-year old water supply program has been unable to build successful water supply systems in rural areas; even as new systems are built, the number of inoperative systems increases. This paper evaluates the impact of the national program and the reasons behind its failure and makes policy recommendations for future A.I.D. water supply projects. The two types of activities supported by Kenya's Ministry of Water Development (MWD) — systems built and operated by MWD and self-help (Harambee) water projects — are discussed. Of special interest is a Harambee program financed by A.I.D. and the Cooperative for American Relief Everywhere (CARE) which succeeded in building only 1/3 of its scheduled projects, with increases in per capita costs of over 100%. Complexity of design, lack of supervision and government support, widely scattered site locations, and the large number of scheduled users were among the problems responsible for these and other MWD project failures. The MWD program's impact is analyzed in terms of reliability, service to users, and socioeconomic, health, and other benefits of rural water supply. The author's main conclusion is that delivering piped water to individual metered connections is inappropriate for rural Kenya due to the lack of engineers, high capital costs, inadequate operational/maintenance funding, and ineffective administration. Specific recommendations are: (1) that groundwater resources be developed and that use of improved shallow wells and handpumps be encouraged; (2) that new projects demand only as much institutional support as is available, while upgrading support capabilities; (3) that additional funding sources for the program be located; (4) that increased system reliability become a primary A.I.D. focus; (5) that health and sanitation measures be included only if existing community practices are deemed inadequate; and (6) that A.I.D. finance self-help projects on a regional or national, rather than a piecemeal, basis. Appendices are included on major donors to the Kenyan program, reasons for diesel system unreliability, water development expenditures, evaluation itinerary, and data collected on selected systems.

015 **PN-AAH-749**

PHILIPPINE SMALL SCALE IRRIGATION

Steinberg, D.I.; Caton, D.; Holloran, S.; Hobgood, T.
U.S. Agency for International Development.
1980, 75 p.

A.I.D. Project Impact Evaluation Report No. 4

Since 1976, the Philippine Government (GOP), with A.I.D. support, has built or rehabilitated over 1,000 village irrigation systems. This document evaluates the two successive A.I.D. projects which have contributed to this effort. The evaluation begins with a brief description of the projects, in which small, subsistence farmers are encouraged to form cooperative organizations called Irrigators Service Associations (ISA's) in order to gain access to loans and electricity and to construct, operate, and maintain village irrigation systems. The GOP provides loan monies and extension services and arranges for electricity to be brought to the area. The next section analyzes the economic, social, and political impact of these projects. Although irrigation provides the opportunity to grow two crops each year and this double cropping has led to increased on-farm employment, these effects have not necessarily guaranteed real income benefits for the farmers, particularly since they must curtail off-farm employment. Increasing costs of production, debt burdens from capital investments, and persistent technological and water management problems have dampened the rise in farm incomes. The small farmers also do not receive the higher price paid by the GOP exporting company because they cannot afford to adequately treat their rice after harvest. The improvement in family income that does occur is often spent on education rather than improved nutrition. A concluding section contains major findings and policy implications. Overall, the village irrigation systems have had immediate and visible benefits. Nevertheless, more extensive use of total farm resources (raising livestock), complementary off-farm enterprises, post-harvest grain treatment, and timely and adequate credit provision will be

necessary to increase farmer income to a level enabling them to carry their debt. The authors recommend, therefore, that any future A.I.D. support concentrate on technical assistance to improve the productive capacity of farms in existing irrigation systems rather than continuing to expand the ISA network. Six appendices concerning related topics, including a 20-item bibliography (1975–79), are included.

492027400; 492030100; 492033400

016 **PN-AAH-936**

REVIEW OF AQUACULTURE DEVELOPMENT ACTIVITIES IN CENTRAL AND WEST AFRICA

Grover, J.H.; Street, D.R.; Starr, P.D.
Auburn University, International Center for Aquaculture.
1979, 98 p.

Fish farming is not widely practiced in Central and West Africa despite promotion efforts dating back to the 1940's, the acceptance of fish as a food by the vast majority of people, and the availability of suitable lands. The purpose of this study is to assess the reasons why these efforts have not had more impact and to suggest improvements. The following responses to fish culture development efforts are noted. (1) The AID-assisted Peace Corps project in Zaire has been impressive: farmer demonstrations have had good yields; Peace Corps volunteers are extremely dedicated; and small fish are readily accepted by the rural population. Although government participation has been meager, conditions seem favorable for the expansion of aquaculture. (2) Although Peace Corps volunteers working on fish culture development in Cameroon were as dedicated as those in Zaire, Cameroon simply lacks the grass roots interest noted in Zaire. (3) While there is a semblance of fish culture extension and fingerling distribution in Nigeria's Oyo State, the impact of these programs has not been great. On the other hand, a large land clearing and fish farm development scheme in the Bendel State (managed by the U.S.-based Tiffany Farms) has generated considerable interest among other Nigerian states and investors. (4) Little, if any, fish culture in Liberia is taking place at the village level; nor are there sufficient hatcheries or local biologists to sustain a development effort. Nevertheless, the authors view the current USAID proposal to strengthen the Central Agricultural Experiment station at Suakoko as worthwhile. Aquaculture, it is concluded, has the potential to provide both food and income for rural village dwellers. Future development efforts should begin with a careful country-by-country inventory of land, water, climate, and other resources to assess each area's suitability for fish culture. In addition, future efforts should be integrated with health education programs emphasizing fish as a source of protein and the need to control schistosomiasis. The report includes a sociocultural overview, individual country analyses, and a bibliography (33 entries, 1961–79).

AID/DSAN-C-0053 931131400

017 **PN-AAH-968**

WATER RESOURCE DEVELOPMENT IN INDIA: ISSUES, PROBLEMS, AND PROSPECTS

Posz, G.S.; Peterson, D.F.
USAID/India.
1980, 35 p.

The future of India will be determined to a significant degree by its success or failure in developing its water resources. The failure of the 1979 monsoon — which resulted in one of the worst droughts of recent record and caused an 8-10% drop in agricultural production and near stagnation in the national economy — highlights India's desperate need for more abundant water. This report provides a current account of water resources development in India, with particular emphasis on irrigation and agricultural production. Although India's average rainfall is approximately 120 cm (slightly more than the global mean of 99 cm), it is seasonal and often erratic in timing and geographical distribution. Groundwater is unevenly distributed as well. Although irrigation development is a priority of the Government of India (GOI), the nation's existing irrigation systems are inefficiently managed. The remedy is increased construction and improved operation of distribution channels. It is estimated that a reduction in water transit losses, provision of regulatory structures, and crop planning could increase the total amount of irrigated land by as much as 25%. In addition, effective use of groundwater resources will require that the GOI assign a high priority to rural electrification because electricity provides a more economical and efficient means of lifting groundwater for irrigation purposes than diesel-powered pumps and devices driven by draft animals. Water rates charged to farmers are too low. However, it is unlikely that the central government will try to force either higher rates or other reforms through the state assemblies, where there would be sharp resistance from landholders. Inter-basin transfers to water-scarce states via a national water grid seems equally unlikely. Most probably, a national grid will be developed incrementally, with a series of projects gradually extending the system throughout the country. Overall, scarcity of capital, rising construction costs and other economic constraints will probably slow the rate of water resources development in India — particularly with regard to the expansion of irrigated lands.

018 **PN-AAH-974**

RURAL WATER PROJECTS IN TANZANIA: TECHNICAL, SOCIAL AND ADMINISTRATIVE ISSUES

Dworkin, D.
A.I.D., Bureau for Program and Policy Coordination, Office of Evaluation.
1980, 31 p.

A.I.D. Evaluation Special Study No. 3

For this evaluation of A.I.D.'s rural water projects in Tanzania, a survey was conducted of 20 Tanzanian villages whose completed water systems used the four major technologies available for dry, wet, and mixed regions. Villages visited represented regions with

different natural water resources. Three major results from this survey are presented in this report. On the technological level, it was found that of the types of water systems surveyed — those driven by diesel engines, gravity, windmill/diesel, and shallow well handpumps — handpumps represented the most appropriate technology due to their greater reliability and lower capital and operating costs. Shallow wells were also labor-intensive and the use of local construction and maintenance materials increased employment. A lesson learned was that a number of diesel and windmill/diesel systems did not function due to a lack of funds for fuel and parts. It was also found that most users were willing to pay operational costs if the systems were perceived as equitable and useful. Finally, on the administrative level, it was found that some donors set up separate parallel organizations with offices isolated from the office of the Regional Water Engineer who will eventually be responsible for the project. Without close coordination, successful continuation of the project is uncertain. Three recommendations corresponding to these results were made: (1) A.I.D. should specify the use of shallow wells with handpumps for village water projects in Tanzania. (2) Users should pay for the system's operating and maintenance costs and be involved in the water supply decision. In addition, rural water projects should incorporate a method to assess users and to collect funds to cover operating and maintenance costs. (3) Project planners should ensure that the activities of the Regional Water Engineer are integrated with donor initiatives. This can be accomplished by training counterpart personnel; conducting periodic reviews to prevent duplication; and adopting or adapting the methods of donor projects into the regional program. Appendices on field studies, bilateral assistance, and technical requirements for A.I.D. potable water projects are included.

019 **PN-AAH-975**

KOREAN IRRIGATION

Steinberg, D.I.; Morrow, R.B.; Palmer, I.; Dong-il, K.
U.S. Agency for International Development.
1980, 89 p.

A.I.D. Project Impact Evaluation Report No. 12

The irrigation project evaluated in this report was designed to help South Korea become self-sufficient in rice and barley and to raise farm incomes. Fifty-five irrigation works including pumping systems, drainage, reservoir construction, and land reclamation were completed. All were small (and in many instances nearly complete) elements of a larger system. Rice self-sufficiency was achieved by 1975, soon after the project began. Barley production declined due to a high rice support price and a growing demand for wheat in urban areas. Farm incomes increased. However, because farm incomes are directly related to farm size, the project affected beneficiaries unequally. The project's success is attributable to the high degree of engineering and administrative competence demonstrated by the Government of Korea, the effective delivery of extension services and agricultural inputs, and the high support price for rice. Lessons learned include the following: (1) More attention to overall economic trends and collection of baseline data is needed in the project design stage. (2) Small and medium irrigation schemes can be economical when added to an already effective farming system. (3) Because neither the bureaucratic nor social structure of Korea permits farmers and their wives to participate in project decisionmaking, community development outputs should not be expected from such special projects. (4) The assumption that a strong correlation exists between higher income and improved nutritional standards is false in non-subsistence economies. Korean farm families directed their extra income to the education of their children rather than to dietary improvements. (5) Unless the effects on women are considered in the project design, women's working conditions may deteriorate. (The labor-saving technology introduced in this project benefited men; women have undertaken a larger share of the field work as children have left home for school or urban employment.) Aging of the farm population as the result of increased education and migration to urban areas will be an important factor in future farm development. Appendices include related socioeconomic studies and a brief bibliography (11 entries, 1974–80).

489070600

020 **PN-AAJ-208**

THE IMPACT OF IRRIGATION ON DEVELOPMENT: ISSUES FOR A COMPREHENSIVE EVALUATION STUDY

Berry, L.; Ford, R.; Hosier, R.
A.I.D., Bureau for Program and Policy Coordination, Office of Evaluation.
1980, 82 p.

A.I.D. Program Evaluation Discussion Paper No. 9

Although irrigation can greatly improve the world's capacity to feed itself by increasing agricultural production, most irrigation projects fall short of this goal. These failures are due sometimes to defective design, but more often to the expense involved, poor management and leadership, and improper use of resources. A sound system of evaluation can improve the effectiveness of these projects. This report examines A.I.D.'s current evaluation process and recommends revisions to improve project design. After reviewing the current status of irrigation in the developing world, the authors discuss A.I.D.'s evaluations, which typically concentrate on a project's conformity to its original purpose or on the performance of the implementing agency. The study found no evaluations which look comprehensively at a project's three stages — preparatory, construction, and operational — or examine and compare basic themes of irrigation project designs. Recommendations are: (1) that in order to improve project management and design, far greater use be made of evaluation data; (2) that evaluations focus on donor, host country government, and user needs; (3) that a grid of analytical questions/criteria be used consistently in evaluating each project; (4) that use of local public and private institutions in evaluating projects be increased; and (5) that evaluations stress management and environmental issues and farmer risk responses. Finally, evaluation guidelines designed around five major components are presented for routine use at

each of a project's three stages. The five areas are economic viability; use of land, water, capital, and labor resources; performance and management of the water system; environmental effects (including health impacts); and social soundness, including effects on production and income distribution. At least one project from each of A.I.D.'s four regional bureaus should be selected for more detailed examination, and an overview of the irrigation in each region where A.I.D. has or will have irrigation projects should be developed. A 107-item reference list (1967–80) and annexes on related U.N. projects, environmental considerations, and criteria for project site selection are appended.

930008500

021 **PN-AAG-922**

THE SOCIOLOGY OF PASTORALISM AND AFRICAN LIVESTOCK PROJECTS

Horowitz, M.M.

A.I.D., Bureau for Program and Policy Coordination, Office of Evaluation.
1979, 115 p.

A.I.D. Program Evaluation Discussion Paper No. 6

To be successful, development projects not only must be technically sound but also must take account of developing countries' values and indigenous strategies. This paper analyzes the sociological and ecological assumptions which underlie A.I.D. interventions in the West African livestock sector. Against a background portrait of the African herdsman, A.I.D. sector interventions in the region (infrastructure improvements, replication of western commercial production systems, and organizational innovations) are identified and critically reviewed in terms of the problems of desertification and mixed farming, range tenure, pastoral offtake, mobility, herd management, and the role of women. The author faults A.I.D. projects for ignoring the social and ecological realities governing African pastoral life. He stresses the fact that pastoralist behavior is a logical outgrowth of past involvement with the Sahel environment. Development efforts which impinge on mobility or threaten the herd's ability to support a large number of persons will be resisted. "Top-down" approaches that ignore the highly individualistic nature of West African herdsmen are likely to meet with failure. In line with the work of other anthropologists and social scientists, the author notes the following functional relationships between herdsmen and herding conditions which should be safeguarded in livestock interventions: (1) Due to the variability of semiarid grazing conditions, mobility is often necessary for survival. (2) Pastoralists recognize claims existing on land and water use and their movement is constrained by those claims. (3) Pastoralists seek to increase and maintain the size of their herds because of the many and different benefits deriving therefrom. (4) Despite the desire to increase herd size, there are managerial constraints on the number of animals maintainable under the direct control of a single herding unit. Expansion beyond that point leads to diminishing returns, reflected in an increase in disease, predation, theft, runaways, and watering costs. A 108-item list of French and English references cited (1939–78) is appended.

022 **PN-AAH-238**

REPORT OF THE WORKSHOP ON PASTORALISM AND AFRICAN LIVESTOCK DEVELOPMENT, HARPERS FERRY, WEST VIRGINIA, 1979

Institute for Development Anthropology; A.I.D., Bureau for Africa and Bureau for Program and Policy Coordination.
1979, 86 p.

A.I.D. Program Evaluation Report No. 4

At a recent workshop on pastoralism and African livestock development, it was agreed that livestock sector programs must be reoriented to make them more compatible with the social, economic, and environmental realities of arid and semiarid pastoral regions of Africa. This report summarizes the discussions of that workshop. Workshop topics included range degradation and productivity, program and project objectives, institution building, marketing, and case studies examining the SODESP Senegalese Project, the Maasai Livestock Project in Tanzania, livestock development in Kenya, and the evolution of livestock projects in Botswana. Consensus on the following points was achieved. (1) Quantitative data relating to pastoral systems are unreliable for two reasons. First, arid and semiarid regions experience considerable climatic instability. Data gathered at a specific time or location may not be relevant under future conditions. Second, data gathering techniques are insufficiently standardized to encourage comparability. (2) Management units for development interventions in livestock should be both small scale and based on existing cultural ecological systems. In large projects, decisionmaking is centralized and remote from individual herd managers who are locally in charge of herd movements and offtake. (3) Herd mobility can be due to crisis-survival mechanisms or effective strategies for long-term range exploitation. Planners must understand these processes and find ways of delivering quality-of-life services to mobile populations without constraining mechanisms of pastoral life. (4) Semiarid rangelands can undergo biological and climatic stress without long-term secular degradation, the very identification of which is difficult. Incorrect range analysis and treatment can exacerbate the semiarid ecosystem. (5) Livestock program emphasis should be placed on supporting the subsistence base of the pastoral herder rather than stressing commercial activities benefitting consumers. (6) Program monitoring and evaluation should be made components of programs in the livestock sector. Areas of further research are specified. Appendices include a list of workshop participants and agenda, and questionnaires.

AID/otr-G-1741 930004700

023 **PN-AAH-721**

CASSAVA DISEASES IN AFRICA REVIEWED

Terry, E.R.; Oyekan, J.O.
International Institute of Tropical Agriculture (IITA).
1976, 3 p.

Cassava (*Manihot esculenta*), a hardy, tropical lowlands plant, annually yields more than 50 million tons of edible roots in Africa alone, where cassava is a diet staple in 40 nations. Cassava,

however, is susceptible to a wide variety of diseases, some of them of unknown origin. This report by the International Institute of Tropical Agriculture (IITA) reviews cassava's six major disease types. (1) Cassava mosaic disease (CMD) is caused by a virus or virus-like agent and results in chlorosis of the leaves' discrete areas. Spread by whiteflies and by planting cuttings of infected plants, it causes a yield loss of 20–90% and is active in all of East, West, and Central Africa. (2) The virus-caused cassava brown streak (CBS) renders tubers inedible by causing extensive root necrosis. Active along Africa's east coast, CBS' main symptoms are leaf chlorosis and brown streaks on plant stems. Control of CBS requires use of disease-free planting material. (3) Cassava bacterial blight (CBB), one of the most devastating of bacterial diseases, affects the yield and planting material. CBB reduces yield by 36.6–58.2%; is characterized by water-soaked leak spots on plant leaves; and is spread by rain splash and the use of infected plant material. Use of disease-resistant cassava varieties can control CBB. (4) Cassava anthracnose (CA) is a fungus that has dramatically affected cassava in Nigeria, Zaire, Ivory Coast, Liberia, and Ghana. In 1975, an estimated 90% of Zaire's plants were severely affected by CA. (5) Grey leaf blotch, brown leaf spot, and white leaf spot are cassava's major leaf spot diseases (*Cercospora*). They are caused by fungi spread by the infection of new plantings by the conidia of old, infected cassava. (6) *Phytophthora* and white thread disease are the two main root rot diseases affecting cassava. They appear where drainage and excessive rainfall are problems. Their control requires good drainage, use of light soils, avoidance of waterlogged areas, sensible crop rotation, and an early harvest. The report notes IITA development of disease-resistant cassava strains and includes a 21-item bibliography (1938–75) of English and French sources.

AID/ta-G-1251 931030900

024 **PN-AAH-722**

CONTROL OF IMPORTANT FUNGAL DISEASES OF POTATOES: REPORT OF THE PLANNING CONFERENCE, LIMA, PERU, 1978

International Potato Center.
1979, 184 p.

Since potatoes constitute the staple food of much of the world's population, many studies have been conducted on methods of controlling potato diseases. This report of the Fifteenth Planning Conference sponsored by the International Potato Center presents an overview of the latest research on fungal potato pathogens. Numerous research papers discuss the control of such potato diseases as early and late blight, wilt, stem rot, white mold, potato black wart, and rhizoctonia. Attention is also directed to pathogens commonly afflicting stored potatoes awaiting marketing. Each paper examines the incidence and impact of the disease as well as measures for its control. One paper, studying the development of potato types resistant to late blight pathogens, suggests such control strategies as the development of potato cultivars resistant to pathogen penetration and to mycelial development in the infected tissues and development of laboratory methods to screen resistant levels in potentially valuable potato selections. The chemical and biological properties of chemicals used to control fungal diseases in potatoes, including those with systemic and soil-disinfecting effects, are listed in an extensive table. Disease-specific recommendations of this conference include: using three potato types with high, medium, and low disease resistance at all late-blight testing sites to provide standards with which to compare new potato clones; conducting studies on the physiology of late blight parasites to increase the ease and rapidity of identifying stable resistance in potatoes; determining if usable levels of resistance to early blight exist in potato germ plasm; and conducting a survey to determine the geographic distribution and importance of *Verticillium* (a soil-borne fungal pathogen). General recommendations include: preventing the spread of viruses, bacteria, and fungal pathogens to various regions of the world; and adopting tests for detecting the presence of pathogens other than fungi. A total of 265 references (1879–1978) in English, French, Dutch, and German conclude several of the papers.

AID/DSAN-G-0079 931097300

025 **PN-AAH-743**

LETHAL YELLOWING DISEASE OF COCONUT IN JAMAICA

Eskafi, F.M.
University of Florida; University of West Indies, Jamaica.
1979, 50 p.

The coconut palm produces food, drink, fuel, and shelter in the form of 90 different products used in the domestic economies of many tropical nations. In Jamaica, coconut plantings cover approximately 62,000 acres. In 1977, however, earnings from copra production dropped by $8.37 million. Nearly 60% of this loss was attributable to lethal yellowing disease (LYD). It is estimated that the susceptible varieties of "Jamaica Tall" coconut trees have been dying at the rate of 1,000 per day over the past 7 years. In the coconut palm, LYD causes yellowing of the fronds, premature fruit drop, and death of the tree in 3–18 months. The purpose of the present research study was to identify species of occasional palm-feeding insects present on coconuts in Jamaica for comparison with results obtained in Florida and to test the vector status of selected species. Past studies of vascular tissues, translocation, and xylem pressure of LYD coconut palms have suggested that wilting in the coconut palm is caused by xylem blockage at a point below the growing point. In the present study, researchers used radioisotope P^{32} to study the phenomena in more detail. Radioisotope P^{32} was injected into 45 Jamaica Tall variety coconut palms in two LYD locations, Caenwood and Plantain Gardens, during the dry and rainy seasons, respectively. Again, these data suggest that xylem flow is severely limited in palms with LYD — even in early stages of visible symptom development. In addition, approximately 10,000 homopterans were trapped on and around these trees and checked for ingestion of radioactivity using X-ray film and gas flow counting techniques. Among the insects which fed on palms and were caught in traps, 22 species and 7 genera

were tentatively identified. Five specimens are unknown. Some species collected during the course of this study have not been tested at all, or have never been adequately tested. These include *Dawnaria sordidulum* (Muir), *Idioderma varia* (Van Duzee), *Typhlocybella minima* (Baker), *T. maculate* n.sp., *Cedusa wolcotti* (Muir), *Cedusa* sp., *Agalliopsis tropicallis* (?) [sic], and several species of the genus *Empoasca*. The authors suggest that phloem feeders of the above insects be extensively tested.

AID/ta-C-1368 931115700

026 **PN-AAJ-094**

PROCEEDINGS OF THE CONSULTANTS' GROUP MEETINGS ON DOWNY MILDEW AND ERGOT OF PEARL MILLET

International Crops Research Institute for the Semi-Arid Tropics (ICRISAT).
1975, 145 p.

In the harsh environment of the semiarid tropics, the hardiest major crop is pearl millet. Recent breakthroughs in pearl millet hybrids promise much greater grain yields and a more favorable ratio of grain to fodder. These new hybrids are characterized by their shorter stature, good tillering ability, ahd increased production of fuller, compact grain heads. Using these hybrids, India's pearl millet production increased by 36% within 3 years. When grown on a large scale, however, the plants are very susceptible to the diseases of downy mildew and ergot (DM&E), a condition which may end all hopes raised by the new genotypes. The popular hybrids HB-1, HB-3, and HB-4 succumbed to DM&E, resulting in a net result of reduced stand, depressed yields, and losses to farmers, who show increasing doubts about the hybrids. The incidence of diseased plants is between 5–50% and is particularly prevalent in India. This report reviews the current knowledge on DM&E and seeks to establish a priority of activities likely to result in their control. Individual research reports included in this review were contributed by 14 scientists from India, Israel, Senegal, Thailand, and the United States. A comprehensive review of DM&E and its effects upon pearl millet and a bibliography (1884–1975) are included in this report. The review's topics include DM&E's geographical distribution; reproduction; host range; and biological and chemical control. Eight informal papers on DM&E's characteristics and research aspects are contained in this report, as well as the summaries of four discussion sessions held at the Consultants' Group Meeting on DM&E, sponsored by ICRISAT. The topics discussed consist of DM&E's hosts and pathogens, the identification of research priorities, and smut infections. The Group Meeting participants' technical recommendations focused on specific research methods and areas concerning DM&E's pathogens, hosts, and control measures. The participants also proposed that an International Millets Working Group be formed to exchange information through a newsletter and that ICRISAT consider disseminating research papers to pathologists researching millet diseases.

AID/ta-G-1073

027 **PN-AAH-602**

RISK AND ALLOCATIVE ERRORS DUE TO IMPERFECT INFORMATION: THE IMPACT OF WHEAT TECHNOLOGY IN TUNISIA

Nygaard, D.F.
1979, 145 p.

Thesis (Ph.D.)–University of Minnesota

In the 12 years since high-yield varieties (HYV) of wheat were introduced in Tunisia, only 15% of all farmers have adopted them. This Ph.D. thesis explains the low adoption rate by analyzing the factors affecting a producer's input decisions (including seed choice), the judgemental errors made in output projections, and the effect of such misjudgements on wheat productivity. Using findings from numerous studies on producer decisionmaking, the author develops a theoretical model to describe this decisionmaking process under uncertain physical conditions and in a dynamic economic setting. This model incorporates risk and uncertainty variables and notes the difference, or "allocative error," between the producer's output expectations — based on input decisions — and the actual outputs. By introducing a risk variable, the author was able to develop a mathematical formula testing the conventional hypotheses that: (1) HYV's have a higher risk attached to their production than do ordinary varieties; (2) small farmers tend to be more risk-averse than large farmers; and (3) the allocative errors caused by imperfect information, knowledge, and managerial ability are greater for new production techniques, thus increasing farmer reluctance to adopt them. The model is then applied to Tunisia using data collected from 125 wheat producers. It was mathematically proven that risk perceptions do indeed affect decisions by Tunisian producers and that producers' errors of perception are responsible for reduced profits and misallocation of resources. It follows that introducing greater certainty into small farmer calculations will increase adoption of HYV's and so increase productivity and profits. Various policy options, such as plant breeders, price schemes, and insurance programs, are suggested as means to reduce perceived risks. The beneficial role of extension programs in reducing allocative errors due to misperceptions is emphasized. A 78-item bibliography (1956–77) and appendices on supplementary regression, sample questionnaires, risk parameters, and allocative errors are attached.

AID/ta-BMA-5 931023600

028 **PN-AAH-640**

AN INTEGRATED APPROACH TO GUAYULE RESEARCH

McGinnies, W.G.; Taylor, J.G.
University of Arizona, Office of Arid Lands Studies.
1979, 27 p.

Development of guayule, *Parthenium argentatum*, as a dependable source of domestic rubber is complicated by the plant's anatomical, physiological, and genetic complexity, especially when cultivated under conditions not native to it. Domestication of

the guayule plant involves several problems, among them genetic manipulation and breeding, the expense of guayule stand establishment, and the effects of irrigation on its rubber-producing capacity. In addition, economically feasible rubber production depends on the assessment of economic, environmental, institutional, and socioeconomic factors. Because of the intricate nature of the research needed to solve these problems, the authors of this paper call for an interdisciplinary, integrated approach to the study of all aspects of guayule rubber production and provide a structure for this approach. Designed to culminate in the successful development and cultivation of the rubber-producing guayule plant, a flow diagram is presented. The diagram is based on a "structured programming" method, where the broadest concept is defined first, and then divided into second-order components until the required degree of detail is attained. Research priorities are not defined by this flow chart. First-level topics include the plant itself, its growing conditions, production, products, economics, and impacts. Second-order topics include, in order: (1) anatomy, physiology, and genetics; (2) climate, soils, water, and biological constraints; (3) propagation, growing, harvesting, and processing; (4) rubber and by-products; (5) production costs, demand, and competition; and (6) environmental, economic, social, institutional, and political impacts. Underlying the entire structure is the collection, exchange, and dissemination of information gained from each area of research. The authors stress that these research efforts must be cooperative to avoid unnecessary duplication and that information dissemination must be comprehensive if research points to economically feasible rubber production from guayule.

AID/ta-G-1111 931015900

029 PN-AAH-822

ASSOCIATION OF "AZOSPIRILLUM" WITH GRASS ROOTS

Umali-Garcia, M.; Hubbell, D.H.; Gaskins, M.H.; Dazzo, F.B.
University of Florida, Institute of Food and Agriculture Sciences.
1980, 9 p.

Azospirillum brasilense is a nitrogen-fixing bacteria which has been isolated from the rhizospheres of a variety of tropical and subtropical nonleguminous plants. In contrast to *Rhizobium*-legume symbiosis, *Azospirillum*-grass interaction does not produce visible structures on roots. This paper describes both the adsorption and the colonization of *A. brasilense* on the roots of pearl millet and guinea grass and provides a possible explanation for the limited colonization of intercellular spaces of the outer root cortex. Grass seeds were surface sterilized, germinated into humid air, and incubated for up to 1 month (14-h photoperiods at 35–36°C). In addition, seeds were germinated in sterile 32 oz Mason jars containing 50 ml of Fahraeus medium. Other sterile seedlings were grown for 2 days in Fahraeus assemblies without agar. Adsorption to grass root hairs was measured by direct microscopic assay, using standardized inocula. Roots themselves were examined with an ISI Super III scanning electron microscope at 15 kV. In addition, *A. brasilense* were grown at 37°C for 7 days in pectin medium and harvested by centrifugation. Test results showed that young inoculated roots of pearl millet and guinea grass produced more mucilaginous sheath, root hairs, and lateral roots than did uninoculated controls. The bacteria were found in the mucigel that accumulated on the root cap and along the root axes. Significantly more azospirilla than *Rhizobium, Pseudomonas, Azotobacter, Klebsiella,* or *Escherichia* cells were adsorbed. Furthermore, it was shown that the pearl millet roots released protease-sensitive, nondialyzable substances which bound to azospirilla and promoted their adsorption to the root hairs. Thus, the grass root hairs displayed selectivity in their binding of bacteria. However, these bacteria did not attach to root hairs when the host was grown in the presence of a readily available nitrogen source — in this instance 5 mM KNO_3. In addition, pectolytic activities were detected in pure cultures of *A. brasilense* when grown in a pectin medium. A listing of literature cited (31 entries, 1938–78) is attached to this report.

AID/ta-C-1376 RES 931100400

030 PN-AAH-825

SURVIVAL OF "RHIZOBIUM" IN SOILS UNDERGOING DRYING

Pena-Cabriales, J.J.; Alexander, M.
Cornell University, Department of Agronomy.
1979, 6 p.

The Soil Science Society of America Journal, Vol. 43, No. 5, p. 962-966

The viability (nodule induction) of *Rhizobium*, a nitrogen-fixing soil bacteria, depends on abiotic as well as biological factors. Among the abiotic factors is susceptibility of *Rhizobium* to drought, or more simply, lack of moisture in the soil. This report presents the results of several experiments to assess the capacity of various strains of rhizobia to withstand different degrees of soil drying while retaining the ability to induce nodulation. After first verifying the nodulating capacity of seven streptomycin-resistant strains of rhizobia, cultures were grown, placed in suspension, and transferred to Lima silt loam soil to reproduce. After 3 weeks, the soil was dried and plate counts of the living bacteria were made. Variations of this experiment included testing for changes in viability of *Rhizobium* when polysaccharides are added to the culture medium, determining rhizobia's ability to survive when the soil is rapidly dried, and investigating the effects upon rhizobial growth if there is a constant percentage of moisture in the soil and if they are inoculated into soil without first being grown in culture medium. Accelerating the rate of soil drying increased the rate of rhizobia population decrease; a subsequent slower rate of decline in viability occurred as the soil lost little water. Additionally, exposure of rhizobia to consecutive cycles of wetting and drying further reduced population size with each cycle. However, those surviving the longest did not demonstrate increased resistance to drying in soil. Fast- and slow-growing rhizobia showed no real difference in their susceptibility to dessication. Addition of rhizobia-generated polysaccharide to inoculants enhanced *Rhizobium* viability more than adding polysaccharide directly to the soil. Also, bacteria inoculated directly into the soil, in comparison to those grown first

in the culture medium and later inoculated into the soil, were more resistant to dessication since the cells' formation of microcolonies in the soil acted as a protection system. In tests made with four soils of varying pH, more *Rhizobium* remained viable at the higher pH's of the Arkport and Lima soils. A 10-item list of literature cited (1962–78) is attached.

AID/csd-2834 211(d) 931012700

031 PN-AAH-826

SURVIVAL OF "RHIZOBIUM PHASEOLI" IN COAL-BASED LEGUME INOCULANTS

Paczkowski, M.W.; Berryhill, D.L.
U.S. Department of Agriculture, Science and Education Administration.
1979, 5 p.

Applied and Environmental Microbiology, Vol. 38, No. 4, p. 612-615

Inoculants of nitrogen-fixing legumes consist of rhizobia bacteria cultures mixed with carrier materials. Although dried, milled peat is the most widely used carrier, coal powder may offer greater advantages in this respect. In this research, long-term growth and survival of *Rhizobium phaseoli* strains 127K17, 127K26, and 127K35 were tested using as carriers eight different coals of various grades. The coals used were Pennsylvania anthracite; bituminous coals from Illinois, Pennsylvania, and Utah; lignite from North Dakota and Texas; and subbituminous coals from New Mexico and Wyoming. To prepare the inoculant, rhizobia cultures were maintained on a mannitol-yeast extract and then mixed with samples of coal powder. After an incubation period, the number of viable rhizobia colonies in this coal-based mixture were counted and isolates from the colonies were used to inoculate pinto beans. After 3 weeks, the roots of the bean plants were examined for the presence of nodules caused by rhizobia. Although the coals ranged in pH from 4.7 to 7.5 and varied considerably in both moisture content and moisture-holding capacity, all the coals except Illinois bituminous coal and Texas lignite (both having lower pH's) supported the growth and survival of the rhizobia strains for at least 6 months. There also were no significant differences in survival between the strains of rhizobia used. Although the use of nutrients such as lucerne meal and sucrose has been found to be beneficial in increasing the survival of rhizobia in some types of coal, its use is not recommended since the chance of contaminating the inoculant and stimulating growth of competitive microorganisms is great. In conclusion, it appears that most coals, regardless of grade or source, may be acceptable carriers for *R. phaseoli* inoculants. A 13-item bibliography (1960–76) is appended.

PA/AG/TAB-610-9-76 931061000

032 PN-AAH-870

TANZANIA SEED INDUSTRY SURVEY: REPORT OF EVALUATIONS AND RECOMMENDATIONS

Hagan, A.R.; Bevins, R.J.; Cavanah, L.E.; Poehlman, J.M.
University of Missouri.
1979, 185 p.

The production of high quality seeds of improved and adapted crop varieties is essential for economic improvement of Tanzania's agricultural sector. This report presents the findings of a survey of the components of Tanzania's modern seed industry: breeder seed research development; expansion of pure lines of improved varieties by foundation seed farms (FSF); certified seed production, processing, and primary distribution by Tanzania Seed Certification Agency (TANSEED); quality control by seed laboratories (SL) and the Tanzania Official Seed Certification Agency; and final distribution. Primary attention is directed towards future development of three of these components — FSF's, TANSEED, and SL's. After a brief description of the current status of each of these components, the major constraints hindering their development are identified and specific recommendations are made for overcoming these constraints. Three recommendations of immediate concern are emphasized. First, the development of FSF's should be limited to three seed farms at the Arusha, Dabaga, and Msimba sites. Emphasis should be placed on rapid development of these sites, especially of the newest farm, Dabaga, which still requires additional staffing, planning for the farmstead layout, service building construction, and erosion control improvements. Second, TANSEED operations should be fully and immediately developed so it can handle all phases of seed certification. Finally, efforts should be made to make the SL's fully operational as soon as possible. To this end, considerable investments in facilities and expatriate consultation will be required. Associated with these recommendations are the continuing needs for manpower training and technical and professional assistance in the fields of research, extension, and marketing. A list of supporting organizations and programs essential for successful growth and performance of Tanzania's modern seed industry is included. Appended are recommendations for research and development for crop production, improvement of educational extension programs, and for seed marketing and distribution; the Tanzania Seeds Act; and a 31-item supporting bibliography (1973–79).

AID/afr-C-1139 621009200

033 PN-AAH-931

RAPID CROP IMPROVEMENT USING TISSUE CULTURE TECHNIQUE

Nabors, M.W.; Hardcastle, T.
Colorado State University, Department of Botany and Plant Pathology.
1980, 34 p.

Technical Series Bulletin No. 24

Cell tissue culture techniques used primarily in basic scientific research can now be used to greatly improve plant breeding by rapidly cloning rare, useful plants and by adding new, beneficial alleles to existing crop varieties. Cell tissue breeding will enable new crop varieties to resist specific environmental pressures, surpass the yield of unadapted varieties, and consume less energy. This report discusses the potential of cell tissue culture techniques and details the application of specific methods used to select salt-tolerant plants. Cell culture techniques arrange the mutation and natural selection process into a format that is simpler, better controlled, and more economical than the traditional, lengthy and random, evolutionary breeding mechanisms. Mutant plant production by this technique consists of four steps: (1) Plant cell groups are placed in a medium with nutrients and special hormones to produce an undifferentiated cell mass or primary callus. Callus portions are placed in a liquid gyrotory shaker to separate single cells from cell clumps, a process known as cell suspension. Single cell suspensions are subcultured when cell density reaches maximum value. (2) Specific spontaneous cell mutations are selected through suspension exposure to conditions that favor mutant growth. Thus, an entire culture of salt-tolerant cells was produced in several months. (3) Mutant cells are induced to grow roots and shoots for eventual regeneration into whole plants (a 4–6 week process). (4) After complete plantlets have been formed, they are transferred to a controlled greenhouse environment for testing of phenotype persistance and mutation inheritability. Most regenerated plants arise from one cell and are thus likely to carry the desired phenotype, if selection occurred in the suspension culture. To avoid deleterious mutations, however, spontaneous mutant searches should be conducted before mutation induction. Although tissue culture methodology is incomplete for some major crops, such as soybeans, techniques are complete for immediate incorporation into existing breeding programs for wheat, oats, corn, tomatoes, and barley. Appended is a nine-item bibliography (1965–80).

931000100

034 PN-AAH-937

HANDBOOK FOR THE COLLECTION, PRESERVATION, AND CHARACTERIZATION OF TROPICAL FORAGE GERM PLASM RESOURCES

Mott, G.O.; Jimenez, A.C.
Centro Internacional de Agricultura Tropical (CIAT); University of Florida.
1979, 102 p.

It is vital for scientists to collect for experimentation a greater range of tropical legumes and grasses before the latter are eliminated through clearing, cropping, and land exploitation. Without a set of standardized procedures, an unmanageable mass of sample germ plasm could easily be accumulated. To avoid this situation, this handbook establishes such procedures for the collection, preservation, and characterization of tropical germ plasm resources. The following steps are outlined in individual chapters: preparation for the collection trip; germ plasm collection in the field; description of the collection site; soil sample collection and procedures; collection of *Rhizobium* strains; collection and preservation of insects and pathogenic organisms; characterization and preliminary evaluation; transfer of forage germ plasm; preservation of the germ plasm; and data management. General and technical equipment needed for a collection trip is discussed, as are basic considerations concerning where and when to look for germ plasms. It is suggested that changes in vegetation, topography, altitude, and land use serve as guides in determining whether a stop is advisable. In addition, collection sites should be described as accurately as possible. The system proposed for the description of collection sites consists of a list of descriptors, their code numbers, the number of characters (letters or numbers) allowed for that descriptor, and a dictionary of descriptor definitions. The handbook suggests that *Rhizobium* collections be undertaken routinely since legumes often fail to encounter effective native strains in new environments. Appendices include a list and a dictionary of descriptors used in forage germ plasm collection, characterization, and evaluation; procedures for shipping nodule samples to CIAT; a list of laboratories which isolate strains of *Rhizobium*; a sample seed export form (India); a list of countries/authorities issuing phytosanitary certificates; recommendations and conclusions of the International Board for Plant Genetic Resources Working Groups on the design and cost of seed storage facilities; recommended conditions for germination tests; and country-specific information exchange codes.

AID/ta-G-1425 931015500

035 PN-AAH-951

ANNUAL REPORT, 1979

International Potato Center.
1980, 147 p.

New methods and advances in potato and other agricultural technology have been developed far more rapidly than national programs can absorb and communicate them to the growers. This annual report documents the efforts and successes of the International Potato Center (CIP) in 1979 and urges a marked increase in funding and development of research and extension programs in the 1980's. Problems and progress in each of the nine major thrusts of CIP research are examined in detail. The nine areas are: (1) collection and classification of tuber-bearing *solanums*; (2) maintenance and utilization of germ plasm; (3) control of fungal diseases; (4) control of bacterial diseases; (5) control of viral diseases; (6) control of nematode and insect pests; (7) physiological and agronomic management and stress physiology; (8)

post-harvest technology; and (9) seed production research. A chapter on regional research and training examines activities, conducted in each of CIP's seven regions, which concentrate on production by offering seminars and short courses on technological advances to local scientists. The next chapter focuses on CIP's Training Department, which administers training at CIP's Lima, Peru headquarters as well as in the regions. Training conducted in Lima concentrates on scientific specialties; in 1979, 28 program researchers and extensionists participated in courses on storage, agroeconomic research methodologies and procedures, and production of basic seed. The next chapter presents the results of research by CIP's Social Science Department on four constraints to potato production in developing countries: agronomic management, tuber seed, pest control, and post-harvest technology. In 1979, five trials of 16 treatment combinations were conducted to alleviate potato production constraints. The potential for the potato as a foodcrop in the tropics and the processes/consequences of technological change were also researched. Finally, the success of CIP's Communications Department in providing accurate, timely information to the public is discussed. A 49-item list of CIP publications (1978–79), a 30-item list of research and consultant contracts, and annexes on CIP personnel and finances are appended.

AID/ta-G-1181 GTS 931097300

036 **PN-AAH-969**

WEED CONTROL PROBLEMS IN TANZANIA: A REVIEW TEAM REPORT

Miller, S.F.; Burrill, L.C.
Oregon State University, International Plant Protection Center.
1980, 42 p.

The control of weeds, a major problem of both large- and small-scale farmers in Tanzania, is a complex process that can be approached by an array of biological, manual, and mechanical alternatives. This report assesses Tanzanian weed control practices used by seed farms, the National Agricultural and Food Control (NAFCO) farms, selected research institutes, and small farms. The farms visited produced such crops as maize, millet, wheat, barley, and coffee. A wide range of weed control practices were noted such as the use of chemical herbicides, mulch, close ground cover through multiple cropping, and manually pulling up weeds. The most common weeds affecting crop production are *Rottboellia exaltata*, a grass which grows extremely tall, and *Digitaria scalarum*, a rhizomatous grass which, if uncontrolled, will spread until infested areas become useless for farming. The former is usually treated with herbicides, the latter by manual and mechanical means. Since there is a shortage of trained scientists specializing in weed control, it is recommended that a cadre of Tanzanian government agronomists be given university training to enable them to conduct research and provide technical advice to NAFCO and seed-farm managers. In addition, short-term training in weed control procedures and research techniques should be offered to researchers, NAFCO farm supervisors, and seed-farm managers. Periodic expatriate weed control consultation should be sought and literature on weed control should be made available to the research institutes. In view of the shortage of farm machinery, minimum tillage techniques not requiring much equipment were suggested as an effective and viable means of controlling weeds. For example, stubble planting, a method of planting directly into existing crop residues with no intervening soil disturbance, controls weeds and delays erosion. Most importantly, the role of sound farm management to determine both the proper balance between weed control methods and the correct time and rate of herbicide application is cited as necessary to establish effective weed control. Suggested references (1968–80) are attached.

AID/ta-C-1303 931020600

037 **PN-AAJ-141**

RICE IMPROVEMENT IN CHINA AND OTHER ASIAN COUNTRIES; PROCEEDINGS OF THE FIRST INTERNATIONAL RICE RESEARCH WORKSHOP, GUANGZHOU, CHINA, 1979

International Rice Research Institute (IRRI); Chinese Academy of Agricultural Sciences.
1980, 315 p.

Because rice is perhaps the world's most important food crop, both the governments and the people of rice-growing countries are continuously challenged to increase rice production and improve its quality. This report is a collection of 21 papers presented at the International Rice Research Institute (IRRI) Workshop concerning Asian rice production, with particular attention directed to the People's Republic of China — the world's largest producer and consumer of rice — and India. Each paper is followed by a brief bibliography (1917–79). Emphasis was placed on breeding rice varieties with genetic resistance to insects and diseases and developing cultural practices to enable farmers to control pests without costly chemical applications. Five areas for future collaborative research and testing programs were specified. (1) As part of an international rice testing program, nurseries will be tested in seven Chinese provinces during the 1980 rice-growing season. (2) Innovative breeding methods will be explored. Collaborative research on hybrid rice will involve China and India at first, with other Asian countries joining later. Work on tissue culture will commence with an emphasis on standardizing the culture media. Fifteen seed combinations will be processed through other culture techniques and seeds of 400–600 fixed lines will be sent to IRRI for evaluation under specific environmental conditions and stresses. Scientists also agreed to exchange early-generation materials of crosses for early maturity. (3) Research will be conducted on viral diseases affecting rice, as well as on bacterial blight and rice blast. (4) Several studies of rice insects will be initiated. As part of a multinational project, Chinese scientists will conduct special screening sets to determine varieties resistant to brown planthopper biotypes. Also, preserved parasite and predator specimens will be exchanged to identify natural enemies native to certain regions. IRRI and China will exchange literature on insecticides

(5) Cooperation between the Chinese Academy of Agricultural Sciences and IRRI on germ plasm collection and maintenance will be continued. A list of workshop participants is included.

AID/492-1310-T 498019800

038 PN-AAH-909

SPECIFIC SOIL CHEMICAL CHARACTERISTICS FOR RICE PRODUCTION IN ASIA

Ponnamperuma, F.N.
International Rice Research Institute (IRRI).
1976, 18 p.

IRRI Research Paper No. 2

Although more than 80% of the world's rice is grown and consumed in Asia, increased production is required to keep pace with population growth. Since the extent of arable land in this densely populated region is limited, additional rice cultivation must take place in lands that remain uncultivated largely because of soil problems. To evaluate potential rice lands, an understanding of the specific properties of flooded soils and of the physiology of the rice plant is necessary, because the chemical changes induced in flooded soils drastically alter the criteria used to evaluate land for dryland farming. This report examines the nature of these changes. Within hours of soil submergence, microorganisms exhaust most of the oxygen present in the soil and water. This process increases the soil pH and nutrient availability and eliminates aluminum and manganese toxicities. Rice can exploit these chemical benefits of flooding because of its root system. Flooding also causes the pH levels of both acid and alkaline soils to converge between 6 and 7, although the rate of pH change depends upon the soil's properties and temperature. This stabilization of flooded soils increases the soil's electrolyte content (with conductivity highest in the saline soils and lowest in the leached ultisols and oxisols), as well as the availability of nitrogen, phosphorus, silicon, and molybdenum. Flooding also has disadvantages. The availability of zinc and copper (both of which are important for improved rice production) decreases and harmful concentrations of iron, hydrogen sulfide, and organic reduction products may build up due to the sulfate reduction and anaerobic decomposition of organic matter. These chemical changes brought about by flooding and inherent soil properties complicate the evaluation of saline, sodic, and peat soils with nutrient problems. Because of chemical changes induced by flooding, soils considered unsuitable by dryland criteria may shift into the suitable or conditionally suitable class — and vice versa. Much work needs to be done, however, before chemical criteria can be developed to systematically evaluate land for wetland rice. A 15-item bibliography (1955–75) is appended.

AID/ta-G-1074 GTS

039 PN-AAH-933

BIBLIOGRAPHY OF THE SOILS OF THE TROPICS, VOL. 4: TROPICS IN GENERAL AND ISLANDS OF THE PACIFIC AND INDIAN OCEANS

Orvedal, A.C.
1980, 163 p.

A.I.D. Technical Series Bulletin No. 17

In an effort to inform university researchers of recent developments in agricultural technologies for tropical regions, this extensive bibliography of materials dealing with the geography of tropical soils has been compiled. The bibliography is the fourth of several planned volumes, contains over 3,500 citations (1866–1979) concerning tropical soils on the islands situated in the Indian and Pacific Oceans, and includes French, Spanish, German, and other foreign-language publications which were extracted from the collections of the Soil Classification and Mapping Branch Library and National Agricultural Library, both of the U.S. Department of Agriculture. Several citations refer the reader to soils maps. Where soils maps based on field work are lacking, however, materials are cited which assist in the prediction of soil types or at least some of their characteristics. Such material primarily concerns soil environment and land use, namely, geology, geomorphology, landforms, vegetation, and climate. Unless they have some relevance to soil geography, citations about fertilizer technology, microbiology, soil chemistry and physics, and the like are specifically excluded. References to soil geography in the tropics in general are grouped under two headings — citations reprinted from the series' first volume (1975) and citations collected thereafter. A list of abbreviations and "user comment" forms, which solicit readers' remarks and suggestions, are appended.

AID/DSAN-147-696

040 PN-AAG-950

SECTORAL MAPPING: AN EXPERIMENTAL APPROACH FOR EXAMINING PATTERNS OF A.I.D. ACTIVITY BY SECTOR

Hageboeck, M.; Goodhart, B.; Cooley, L.; Boudreau, R.; Berge, N.
Practical Concepts, Inc.
1979, 107 p.

Do outdated "cultural myths" play an important part in the current design and implementation of A.I.D. projects? The purpose of this study was to answer this question using sectoral mapping (a process used to aggregate and analyze automated project data by sector) in conjunction with A.I.D.'s data bases (PBAR, TEXT, BREF, AND ACCT). It was found, however, that A.I.D.'s data bases do not contain the information needed to examine such critical factors as the rationale for projects, strategic choices made about technologies and implementing agents, or patterns of project impact. Also, not all of the data in these files can be easily compared across projects. Nevertheless, sectoral mapping has proven to be a cost-effective method for examining such patterns as the level of investment by bureau for a given sector, the distribution of projects across bureaus, and changes over time within bureaus. The authors recommend that prior to undertaking further sector mapping activities, A.I.D. should clearly define what products can be produced using its data bases (i.e., sectoral maps, summaries of portfolio composition, project information profiles, and trend assessments) and determine the cost and potential market within the Agency for these products. Only those sectoral maps and related products projects that have a high probability of making real improvements in A.I.D. projects should be generated. Also recommended are combining automated and manual searches to retrieve answers to pre-set questions; sampling projects to estimate patterns; excluding searches of pre-1974 projects; using technical codes to develop an overview of A.I.D.'s portfolio by mutually exclusive sectors; linking the data bases with the statistical analysis packages in A.I.D.'s computer system to analyze sectoral mapping data automatically; coordinating efforts by various offices to examine patterns in A.I.D. activity; and using A.I.D. direct hire staff to prepare future sectoral maps. Recommendations to improve the overall quality of the data bases, e.g., by eliminating unused data and by breaking out costs by outputs, are also made. Appendices include a description of the procedures used to generate the experimental sector maps.

AID/otr-C-1377 GTS 930004700

041 PN-AAH-244

APPLIED POLICY ANALYSIS FOR INTEGRATED REGIONAL DEVELOPMENT PLANNING IN THE PHILIPPINES

Rondinelli, D.A.
1979, 29 p.

The Third World Planning Review, Vol. 1, No. 2, p. 150-178

The development in many LDC's of urban industrial centers at the expense of rural areas requires that national development planning be based on a clear articulation of urban–rural (spatial) relationships. This research paper evaluates the methods of integrated spatial analysis used in A.I.D.'s Bicol River Basin Project in the Philippines in order to develop the framework for such development planning. The Bicol project is of interest for three reasons: (1) the spatial analyses used in it are potentially replicable in other countries; (2) the problems in Bicol addressed by these analyses are common in other LDC's; and (3) a study of the project provides insights into urban–rural relationships and the spatial dimensions of rural poverty that are useful in reformulating national investment strategies. The analytical methods and planning procedures used at Bicol were divided into three components. First, on the basis of comparative profiles of social, economic, physical, institutional, and demographic characteristics, Bicol's municipalities were categorized as developing, less developed, or underdeveloped. The profiles revealed that a majority of the Basin population live in areas lacking vital services needed to increase agricultural production, expand employment, and meet human needs; and that they lack access to areas providing such facilities. Second, analyses were conducted of the centrality, functional complexity, and relative importance of the municipalities. The Guttman scale of settlements, weighted centrality indexes, and scalogram analysis were used. The scalogram had advantages over the Guttman scale because it was easy to use and required no sophisticated training or equipment. Third, Marshall's threshold analysis was used to measure population sizes in relation to support services and facilities in Bicol settlements. Spatial linkage analyses regarding transportation, economic, market, social, administrative, political, and service linkages were also undertaken. The positive benefits to the various municipalities yielded by these analyses in the Bicol project are noted in a final concluding section of the paper. A bibliography containing 23 resources (1969–78) is appended.

AID/ta-C-1356 GTS

042 PN-AAH-417

A PRELIMINARY STUDY IN THREE COUNTRIES: INDONESIA REPORT

Milone, P.
International Center for Research on Women.
1978, 304 p.

In Indonesia, a country of over 300 ethnic groups, the enormous diversity of language, religion, education, culture, and custom makes the term "Indonesian woman" inadequate. This paper documents the social, legal, and economic status of Indonesia's 66 million women without neglecting ethnic differences. The first section describes the country's Islamic, Christian, and common-law marriage customs, which impact on every aspect of a woman's existence. The history of Indonesia's women's movement, especially in eliminating child and forced marriages, polygamy, and husband-initiated arbitrary divorce are discussed. This is followed by a portrayal of the difficulties faced by women — particularly the young and/or unmarried — in achieving equal status under the law in regard to child custody, property ownership, control of income, tax liability, access to credit, political

participation, and educational opportunities. The many factors responsible for the high rates of female anemia/malnutrition and maternal mortality are examined, along with the success of family planning programs in alleviating these conditions and in opening new opportunities to women. Women's communications networks and the strength of organized women's groups in the country are also discussed; an annex on membership of the Indonesian Women's Congress gives further details. Also presented are economic and demographic profiles of women, the former including an historical and cultural survey of women's work patterns. The author gives her impressions of the effects of modernization on women, particularly of the negative impact of modern agricultural technology on poor rural women. After a survey of current field investigations (with further information included in an annex), a final chapter critiques the existing data on Indonesian women and offers research recommendations, among them improved coordination of information and institutions, augmented institutional capabilities, modified survey techniques, and an expanded, more accurate information data base. A 317-item bibliography (1911–78) and a survey of current research on women at the University of Indonesia, Faculty of Social Sciences, are appended.

AID/otr-G-1477 906010000

043 **PN-AAH-434**

MANAGER'S GUIDE TO DATA COLLECTION

Hageboeck, M.
Practical Concepts, Inc.
1979, 100 p.

A.I.D. Program Design and Evaluation Methods Series

Project managers, who rely on data to assist them in decisionmaking, project design, and evaluation, often lack the ability to collect the data themselves and must therefore turn to experts. This report is intended as a guide for managers, enabling them to differentiate between credible and suspect data and to direct all data collection efforts on a timely, cost-effective basis. Four aspects of a manager's role in data collection and analysis are discussed: (1) identifying why, what, and when information is needed; (2) determining the appropriate level of funding and time investments; (3) choosing the most effective information-gathering approach; and (4) managing the data collection and analysis process. For example, a manager faced with a need to fund or replicate a project, or to terminate specific activities, may find he needs baseline information. He must then evaluate the prospective cost of data collection to determine whether the value of the information warrants a lesser, or greater, level of investment. The amount of money or time to be appropriated to the data collection necessarily affects the choice of a collection method, as does the existence of relevant information in Mission or Washington offices or in other resource centers. Where sufficient data does not exist, however, the manager may choose a field data collection method. Finally, although the manager does not himself gather the data, he must be able to formulate guidelines for use by the investigators on the study's purpose, its target population, the time frame required, and other issues. The guide specifies criteria to assist a manager in these choices and considers basic information study design issues to help managers determine what answers are needed and how to control their quality. Approaches to field data collection are surveyed to familiarize managers with available options. Finally, the guide examines the benefits and drawbacks involved in using the sampling process and discusses its applicability to managers' needs. Other data collection techniques, such as direct measurement, observation, and interrogation, are presented. A 96-item bibliography (1951–79) is appended.

AID/otr-C-1377 GTS 930004700

044 **PN-AAH-533**

TOURISM TRAINING: MEXICAN NEEDS/U.S. RESPONSES; FINAL REPORT

Group Seven Associates, Inc.
1980, 129 p.

Rapid expansion of the tourism sector in Mexico, combined with tourists' expectations and competition from other countries, has put enormous pressure on Mexico's tourism training institutes. This paper presents the final report of a study conducted to assess training needs, determine the U.S. capacity to assist, and develop a time-phased plan of options to redress the manpower shortages. The study was based on 59 formal interviews with Mexican Government, industry, and school personnel and on responses from 87 U.S. universities which provide training in tourism-related areas. The following Mexican problems were identified: (1) at least 100,000 new employees are needed, 660 of whom should be teachers; (2) too many managers are being trained, while training opportunities for mid- and lower-level staff are very few; (3) hotel management problems are motivational in nature and therefore not subject to improvement by training; and (4) new facilities are needed, especially at basic and middle levels. The next section analyzes U.S. educational resources and provides key information about U.S. programs in the study of hotel and restaurant management, transportation, and travel. A major conclusion is that U.S. resources and experience are more than adequate to meet Mexico's assessed needs. The authors then present a plan to apply U.S. resources to Mexico's tourism training needs. Major aspects of the plan are that the training be local, short-term, and inservice whenever possible; be provided to students preparing for future employment; and be oriented to the acquisition of particular skills. Emphasis is placed on curriculum development, teacher training and exchanges, computerization, and English-language training. The report concludes with a list of ten recommendations in the areas of harnessing U.S. resources to Mexican needs; implementation of the 1978 U.S.–Mexico Tourism Agreement; and implications for tourism training in LDC's. A 7-item list of references (1978–80) and appendices on questionnaires used, descriptions of Mexican training institutes, training needs as perceived by the industry, and two model manpower development projects (Nigeria and University of Guadalajara, Mexico) conclude the report.

AID/SOD/PDC-C-0205 931000300

045 **PN-AAH-642**

THE INCOME AND PRODUCTION OF GUYANA RURAL FARM HOUSEHOLDS; AN ANALYSIS BASED ON THE 1979 GUYANA RURAL FARM HOUSEHOLD SURVEY

Robert R. Nathan Associates, Inc.
1980, 155 p.

Obtaining a clear picture of the economic well-being of farm households in Guyana is a prerequisite for providing assistance to the country's poorest and neediest farmers. To this end, the results of a survey of the income and production of Guyana's rural farm households for the year 1978 as derived from interviews of individuals from 2,306 representative farm units, 2,284 of which were family farms, are presented in this report. To place survey results in their proper perspective, a preliminary analysis of the relationship between agriculture and Guyana's national economic goals, as well as U.S. goals for foreign assistance, is provided. The main body of the report consists of a comparative analysis of the target (i.e., farmers most in need) and non-target groups with respect to their total income, household characteristics related to income, off-farm and farm sources of income, and the expenditures determining the farm portion of net income. The total capital used in terms of land, livestock, and machinery by both groups is also treated. Finally, the levels and efficiency of production, as well as economic returns between the two groups, are compared and their problems in supply and credit procurement are examined. Major findings of this report include: (1) four-fifths of rural farm households had annual incomes below Guyana's target level for development assistance; (2) two-thirds of rural farm household income came from off-farm sources; (3) one-third of farm households reported difficulty in obtaining needed production and service inputs from indigenous sources and so often had to rely on imported inputs for rice production; (4) irrigation systems and conditions were better on non-target farms than on target farms. Based on these findings, the following basic program and policy directives aimed at raising rural farm income are set forth: (1) increasing government support for rural households; (2) encouraging farmers to increase the amount of land under cultivation; (3) improving on-farm water control, the use of imported agricultural inputs, and farm management; and (4) creating more opportunities for off-farm employment. Attached are specifications of derived variables used in the survey.

AID-504-INST-781

046 **PN-AAH-847**

RAPID RECONNAISSANCE APPROACHES TO ORGANIZATIONAL ANALYSIS FOR DEVELOPMENT ADMINISTRATION

Honadle, G.
Development Alternatives, Inc.
1979, 62 p.

Administrators are often faced with having to make decisions based on incomplete, inaccurate information. Social scientists stress the need for rigorous data collection and formal analysis to improve poor data bases. However, this response ignores the frequently strong political and organizational pressures for timely information and rapid decisionmaking. This paper suggests ways to improve quick, impressionistic data collection methods. When employing rapid reconnaissance methods, social scientists discard the usual questionnaire and subsequent quantitative analysis. Instead, reconnaissance practitioners use proxies for complex dynamics and perform spot checks of the proxies. This technique was used to measure the success of a campaign against illegal lumbering in an Asian country. Typical indicators (reported encounters, arrest rates, conviction rates, and confiscated lumber) were discarded as unreliable. The researcher chose instead to monitor the price of elephants — the assumption being that since the major use of elephants was in lumbering, their going rate in the local market would reveal the campaign's effectiveness. Advantages of these strategies include timeliness, low cost, and flexibility. Major disadvantages are the difficulty of judging either the accuracy of the data or (due to the lack of standardization) the investigator's performance. Also, simple proxies can be misleading. For example, it would seem that a spit-and-polish department of agriculture packed with highly paid Ph.D's would be a good indicator of an organization's effectiveness. However, this assumption does not consider the typical unwillingness of highly qualified personnel to travel to rural areas and train farmers. Thus, it is important to articulate and test one's assumptions. The author recommends that studies be made to determine the contingencies that tend to invalidate different types of indicators. Also, social scientists should study tradeoffs between reconnaissance approaches and indepth methods and try different combinations. The author emphasizes that reconnaissance methods are not a panacea for budget constraints or deadlines, but sometimes provide a practical alternative to costly orthodox approaches.

AID/DSAN-C-0065 936530000

047 **PN-AAH-868**

EQUITABLE GROWTH: THE CASE OF COSTA RICA

Rourk, P.W.
Robert R. Nathan Associates, Inc.
1979, 103 p.

A.I.D. Development Studies Program: Case Studies in Development Assistance No. 6

Increased concern with "equity" objectives of development — employment, equality, participation, meeting basic needs — has prompted the search for cases of successful equitable growth. Costa Rica, whose growth is analyzed in this report, represents an example where a rising GNP has been maintained along with an equitable distribution of benefits. The report begins by presenting a brief overview of Costa Rica's growth and of the historical components, i.e., the physical setting, colonial influences, economic developments, and political changes, which have been responsible for its current socioeconomic condition. Public sector programs developed between 1960 and the early 1970's are treated next, including the development of physical infrastructure such as roads, electricity, and housing; human resources, including edu-

cation, health care, family allowances, and nutrition; and land reform and wages policy. Issues and alternatives for equitable growth are treated in a concluding chapter. The rate of Costa Rica's improvement and its current GNP level and standard of living indicate that Costa Rica's performance has been unmatched in Latin America. In order to sustain this development process, four policy areas must be given attention. To address rural–urban imbalances, improvements in the poor's access to land, along with complementary infrastructural developments and increased decentralization of public sector activity, are called for. Employment creation in rural regions should emphasize off-farm vocational activities. The dependency burden of the rural poor should be dealt with through the family allowances program by stressing direct income transfers. This would both reduce administrative costs and increase targeting efficiency. Finally, public financing of education should continue, with priority given to rural education. The text is footnoted and includes a 9-item bibliography (1949–74) in English and Spanish.

AID/otr-C-1380

048 **PN-AAH-949**

PROCEEDINGS, JOINT RESEARCH COMMITTEE WORKSHOP ON THE COLLABORATIVE RESEARCH SUPPORT PROGRAMS, 1980

A.I.D., Board for International Food and Agricultural Development (BIFAD).
1980, 125 p.

The Collaborative Research Support Program (CRSP) concept was designed in response to the Title XII Amendment to the International Development and Food Assistance Act of 1975 calling for "program support for long-term collaborative university research on food production, distribution, storage, marketing, and consumption." Intensive efforts have been made by A.I.D. and U.S. agricultural universities to develop CRSP as a mechanism for applying their long-term, technology-producing research capabilities to solve such developing country problems as post-harvest losses, water management, and small farming and alternative energy systems. In order to improve and strengthen the processes leading to the execution of future CRSP activities, a Joint Research Committee (JRC) Workshop on CRSP's was organized to review and evaluate CRSP experiences in planning, management, and early implementation. This document contains workshop papers discussing such experiences and expressing the insight gained by the JRC, A.I.D., and participating universities into some of the problems and successes of CRSP's. Issues covered in the plenary session on planning included conducting exploratory studies in order to describe problems, to recommend to the JRC potential research approaches (including CRSP's), and to assist the JRC in establishing priorities; Mission involvement in CRSP's; university selection and contracting procedures; and administration of business arising between regular JRC meetings. Discussion at the plenary session on management focused on CRSP management structure, its role in fiscal responsibility, and such A.I.D. policy issues as international travel and the location of CRSP activity. Discussion of experiences in CRSP implementation centered on the small ruminant and sorghum/millet CRSP's which are to date the only CRSP's to have reached the implementation stage. The major concern here was the need for multiple sources of funding, and recommendations were made to investigate possible allocation of food for peace funds and to increase publicity where developing country governments are supporting CRSP's with their own funds. The workshop discussion schedule and a list of participants precede the individual papers.

049 **PN-AAH-725**

ASSESSING THE IMPACT OF DEVELOPMENT PROJECTS ON WOMEN

Dixon, R.B.
A.I.D., Bureau for Program and Policy Coordination.
1980, 108 p.

A.I.D. Program Evaluation Discussion Paper No. 8

The current methodology for evaluating development projects — even "women-specific" projects — concentrates on logistical questions of timing and supplies rather than on social impact questions and is therefore inadequate to assess a project's impact on women. In order to develop a new evaluative framework which addresses these inadequacies, this study reviews evaluations of 32 A.I.D. and private voluntary organization women-specific projects. The evaluations only indirectly assess women's concerns but provide sufficient information to analyze the success of projects in meeting three basic goals for women-in-development projects: (1) participation in project decisionmaking; (2) access to immediate project benefits; and (3) improvement in socioeconomic status. Specific factors which contribute to the achievement of these three goals are identified. For example, women's participation in the decisionmaking process is higher when projects are administered by women's associations. Women's access to benefits will be greater when project activities build on the prevailing sexual division of labor and increase women's control over their own earnings. Social impact of projects tends to be greatest when women are organized for group action and are directed in activities carrying clear economic benefits. Indicators of physical, economic, and social well-being are presented for determining a project's direct and distributional social impact. It is noted that this evaluative framework is useful to assess not only the impact on women of any project (whether women-specific or not), but, more generally, the differing impact of any project on various social groups. The author stresses that factors which increase women's participation in development should be an integral part of project design and that women's economic and social roles in household and community should be taken into account. The paper's final section suggests methods of data collection to improve determination of a project's impact on women; interviews and group discussions with beneficiaries and the evaluator's perceptions are stressed over an objective or documents-only approach. A 50-item reference list (1971–79) is appended.

930008500

050 PN-AAH-982

CHILD CARE NEEDS OF LOW INCOME MOTHERS IN LESS DEVELOPED COUNTRIES: A SUMMARY REPORT OF RESEARCH IN SIX COUNTRIES IN ASIA AND LATIN AMERICA

League of Women Voters, Overseas Education Fund.
1979, 88 p.

The need to expand women's roles to include contribution to household finances in addition to caring for a family is impaired by the lack of options for child care available to women. This report summarizes studies conducted on the effect of women's income-generating activities on child care patterns, health, nutrition, and alternative approaches to child care in six developing countries — Korea, Malaysia, Sri Lanka, Brazil, Dominican Republic, and Peru. While all the countries are agriculture-based, Korea and Brazil are industrialized. The majority of the women surveyed were wives and mothers, had an average of two to four children, were poor, and were currently employed or wished to work. The results showed that child care responsibilities, lack of marketable skills and employment opportunities, and cultural role limitations lessen women's participation in the work force, although participation of low-income women was higher in the six countries than the countries' national averages; child care is handled mainly by female family members due to a lack of awareness of the services offered by child care centers and preschools; malnutrition among children less than 6 years old was common to all the countries; many women demonstrated little knowledge of the causes of child diseases, the value of immunization, or proper nutrition; women's earnings had little effect on the overall well-being of their families; and a comprehensive child care policy and program is a viable alternative for the needs of low-income mothers and children. From these findings it was recommended that national and international agencies make child care and women's needs a priority; alternative forms of child care such as half-day preschools and industry-based child care facilities be developed, with a focus on disease prevention, child nutrition and health needs, and breastfeeding which is in general decline; vocational training be offered to women and information on job prospects for women be disseminated through mass media: and legislation governing women's participation in the labor force be modified to better meet their needs. Appended are footnotes, a list of in-country child care programs, and the research methodology used.

AID/ta-G-1413 931002300

051 PN-AAG-671

RURAL ELECTRIFICATION: LINKAGES AND JUSTIFICATIONS

Tendler, J.
A.I.D., Bureau for Program and Policy Coordination, Office of Evaluation.
1979, 84 p.

A.I.D. Program Evaluation Discussion Paper No. 3

Unlike health, education, or nutrition projects, rural electrification (RE) projects do not directly benefit the poor and have thus been

While their mothers receive training at a vocational center in Nispara, Bangladesh, these children benefit from an early education at an adjacent day-care center.

de-emphasized in recent development assistance programs. RE projects can, however, promote integrated rural development significantly by encouraging productive and municipal, as well as traditional household, electricity usages. In this paper, a justification for increased attention to RE projects is made based on these additional usages, and issues are identified for further exploration. The author notes that RE planners generally tend to seek replication of the successful Philippine RE project, which strongly favored household consumption. Various issues are examined for their impact on the rural poor. These include the choice of rate mechanisms (meter or flat); lowered rates for high-volume users; beneficiaries and cost-effectiveness of RE projects; preference of the consumer for wood in cooking; economic drawbacks to the use of electricity; and the superiority of independent over central station generation. The author concludes that an RE project is not justified on the basis of household consumption alone; most often the poorest members of the community cannot take advantage of the benefits offered by household electricity. They can benefit much more significantly from the increase in employment which accompanies RE use by producers and from the increase in public services resulting from RE's municipal use. A.I.D. should investigate means of encouraging employment generation in RE projects, e.g., by providing credit and technical assistance to small industries. A.I.D. should also identify public services which are electricity-dependent, such as clinics and schools, and link provi-

sion of RE projects with extension of these services. The author also recommends the creation of a central A.I.D. office to promote local (rather than international) suppliers for the equipment and labor demands of infrastructure projects and favors an AID-supported central fund to promote local cooperatives and auto-generation projects. A 94-item bibliography (1966–78) is attached.

930008500

052 PN-AAH-976

THE PHILIPPINES: RURAL ELECTRIFICATION

Mandel, D.; Allgeier, D.; Wasserman, G.; Hickey, G.; Salazar, R.; Alviar, J.
U.S. Agency for International Development.
1980, 71 p.

A.I.D. Project Impact Evaluation Report No. 15

A.I.D.'s overall evaluation of its Philippine Rural Electrification (RE) program, consisting of eight successive projects, had limited effect on the rural poor and the economic development process. This program began in 1965 and has since energized 844 (59% of the national total) Philippine municipalities, 9,088 (27%) barrios, 1,159,434 (20%) households, and 101 new cooperatives; resulting in a change of schedule for total national energization from 1990 to 1987. To improve the productive capacity of the poor, cooperatives were organized and lent funds to extend electrical power into their areas. Many of the poor, however, could not afford its installation, continued use, or more than one or two light bulbs a month. Community lighting, such as street-lighting, indirectly helped the poor in various ways, such as by providing greater personal security. Those with sufficient financial resources or skills were able to use the electricity for entrepreneurial activities. RE impact upon development occurred in areas with a concentrated population, available technical skills and capital, and access to large and diverse markets. Active promotion of electricity-dependent investments and projects also increased program impact. Conclusions reached are: (1) Economic growth requires not only electricity, but also the development of power-oriented projects and programs. (2) Electrification must be complemented by development efforts aimed at the poor if it is to directly provide higher productivity levels, employment opportunities, and better public and social services. (3) The service nature of cooperatives requires that a high priority be given to effective management — even at the expense of beneficiary participation or democratization of the development process. (4) Productive power use and slower expansion rates encourage the financial viability of RE systems. (5) Because of the availability of other fuels, RE does not greatly increase energy demand. Appended are the evaluation's methodology, assessments of the financial viability and development potential of RE cooperatives, cooperative statistics, socioeconomic case studies, an energy impact statement, and a 23-item bibliography (1974–80).

492024800; 492031400; 492088800; 492030600
492032100; 492016900; 492009500; 492018900

053 PN-AAH-978

BOLIVIA: RURAL ELECTRIFICATION

Butler, E.; Poe, K.M.; Tendler, J.
U.S. Agency for International Development.
1980, 56 p.

A.I.D. Project Impact Evaluation Report No. 16

Two rural electrification systems initiated in Bolivia in 1973 and 1974 are the subject of this report. By 1979, all distribution networks were completed, except in the La Paz region. Power was supplied to 42,000 consumers and was used primarily for residential lighting. Although demand outpaced supply, consumption per household was lower than projected, and irrigation and industrial use was negligible. The preponderant positive impact of the projects was social. Household lighting improved the physical quality of life for 7% of Bolivia's rural population. Electric light was more convenient, less expensive, safer, and healthier than previous lighting sources such as kerosene and candles. Unfortunately, electrical power did not appear to play a catalytic role in economic development nor was it a precondition for it. Excessive technical design standards increased capital and operating costs of the systems. The premature termination of project financing for the initial hookups resulted in disproportionate exclusion of the poor from project benefits. The urban-rural rate structure, although beneficial, provided insufficient revenues for utilities to expand the rural systems. In addition, the absence of an aggressive promotion program, including a mechanism to mobilize financing by beneficiaries, resulted in a smaller number of residential and productive consumers than might otherwise have been possible. Several lessons were learned: (1) Similar projects should be located where a demand for productive use is evident from the productive use of other forms of energy. Alternatively, if the project purpose and probable impact is purely social, the system should be designed to maximize household connections. (2) Designers should introduce cost constraints into technical standards by allowing choices to be made by host-country technicians and by those who will be concerned with the utility's revenue-earning operations. (3) Electrification projects should be linked to other development activities. (4) A vigorous promotional program to teach rural people how to obtain and make productive use of electric service is recommended.

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054 **PN-AAG-795**

AGRICULTURAL CREDIT POLICY IN BRAZIL: OBJECTIVES AND RESULTS

Araujo, P.F.C. de; Meyer, R.L.
Ohio State University, Department of Agricultural Economics and Rural Sociology.
1978, 26 p.

Savings and Development, No. 3, p. 169–192

Over the last decade, Brazil has made agricultural credit the cornerstone of its development strategy. The present study analyzes the objectives and results of this strategy, with emphasis on the behavior of agricultural lending, in order to assess its possible replication in other developing countries. Brazil has used the existing banking system almost exclusively to channel credit into agriculture. While employing credit controls, discount mechanisms, and reserve requirements that have been used by other developing countries, Brazil has experimented with controls on interest rates and bank mergers. Actual interest rates have been set lower than those charged to other users. Specifically, rates for loans to small farmers in poor agricultural areas are lower by 1–2% than the discounted rates that are assessed to larger agricultural loans. Incentives and controls have been established by the government to encourage official and private banks to channel their lending in the direction of agriculture. Results have demonstrated that agricultural credit has sharply increased relative to output. Agricultural investments in machinery have particularly increased. Nevertheless, the spread effect of this credit has been limited, since 90% of all farms in Brazil have not received this credit. Approximately 75–80% of the credit has been used by commercial farmers in a few southern states. Also, it is evident that farmers receiving these large commercial loans have either used the money elsewhere or have used the money to free their own funds for private needs. The authors state that the Brazilian experience cannot be fully judged until it is allowed to operate under more favorable conditions where credit distortions are not as pronounced. Until the rates on agricultural credit are raised so that lenders are not penalized for agricultural loans, there is no way to judge how well lenders will meet farming needs and at what price. A list of 25 references (1971–76) is included.

AID/ta-G-1331 931000300

055 **PN-AAH-103**

THE FUTURE OF BASOTHO MIGRATION TO THE REPUBLIC OF SOUTH AFRICA

Eckert, J.; Wykstra, R.
Colorado State University, Department of Economics.
1979, 28 p.

LASA Research Report No. 4

Lesotho's economic dependence on remittances from its migrant laborers employed in the Republic of South Africa makes it acutely vulnerable to changes in migration opportunity. This paper analyzes demographic, economic, social, and political factors affecting the future of Basotho migratory labor, predicts the magnitude of changes that may be expected, and considers the implications of such changes for Lesotho's domestic economy. Migrant opportunities are likely to decline substantially during the next two decades due to chronic domestic unemployment in South Africa and changing trends in gold and coal mining production. Studies indicate that South Africa's indigenous labor force will increase annually in excess of employment rates needed to absorb this growing force. This situation will result in a displacement of 0.5 million foreign laborers, 47% of which are Basotho, leaving Lesotho prey to economic instability. Because of the value each commodity has recently acquired, both the gold and coal industries are rapidly expanding their production by use of capital-intensive techniques. This shift reduces labor requirements, as fewer employees can produce higher tonnages with mechanization. Other mining trends which will contribute to massive decreases in Basotho employment are the depletion of several gold mines at which Basotho migrants work and mining in distant locations beyond the economical reach of the Basotho. Such a displacement, according to this study, is beginning to occur. Because the Government of South Africa and South African mining industries are aware of the consequences that a sharp reduction in the Basotho labor force will have, a gradual reduction with advance notice is predicted. Most of the adjustments will occur during the 1980's, probably resulting in a 50% reduction of currently employed Basotho by the year 2000. This reduction will require Lesotho to increase domestic employment of males sixfold and will lead to widespread income inequalities as well as to sharp declines in Lesotho's gross national product and in government revenue from imports. Thirty-six entries (1976–78) are cited for further reference.

AID/afr-C-1387; AID/ta-CA-1 690003100

056 **PN-AAH-330**

LESOTHO'S EMPLOYMENT CHALLENGE: ALTERNATIVE SCENARIOS, 1980–2000 A.D.

Eckert, J.; Wykstra, R.
Colorado State University, Department of Economics.
1979, 37 p.

LASA Discussion Paper No. 7

Lesotho's employment situation is highly unusual, with more than 50% of Basotho males of working age employed abroad and five-sixths of the country's real growth in gross national income since independence the result of increases in migrant wages. This situation is likely to change drastically during the next 20 years, requiring a fundamental restructuring of Lesotho's economic base. In anticipation of such a change, this paper presents alternative projections of the probable growth in Lesotho's domestic labor force — due to reduced migrant labor opportunities — in order to estimate the total labor force which the domestic economy must absorb by the year 2000. High and low estimates are made of the size and composition of the Basotho population and labor force and alternative migration scenarios for the years 1980–2000

The extended drought in the Sahelian Zone caused decreased food production and famine in Mauritania, Mali, Senegal, Upper Volta, Niger, and Chad. Because infrastructure investment has not been emphasized in this region, these members of the Peul tribe must travel to a distribution center to receive food.

are presented. By combining estimated labor force sizes with likely migratory patterns, the number of Basotho requiring jobs in the domestic economy is derived. Estimates are also made of the potential labor demand for agricultural and other rural activities which traditionally serve as the residual employer in developing countries. Lesotho's projected employment crisis for the year 2000 is reflected in the following statistics: (1) The *de jure* population will increase by nearly 70% to more than 2.25 million; (2) the active labor force will exceed 1 million; (3) migrant employment in South Africa is likely to decline by 50%, leaving only 100,000 such jobs and demanding the creation of 900,000 jobs in Lesotho; (4) employment increases in Lesotho's modern sector (government, commerce, industry) will be insufficient to absorb all the migrants expected to return; (5) the need for agricultural jobs will appear suddenly, as migrants return faster than the modern sector can absorb them; and (6) between 18–20,000 new jobs are needed in agriculture and traditional activities each year for the balance of this century. A 14-item reference list (1973–80) and tables presenting male and female populations by age groups projected to the year 2000 at both constant and increasing growth rates are appended to the report, as are alternative estimates of the number of jobs which must be created in agriculture.

AID/ta-BMA-6; AID/ta-CA-1

057 **PN-AAH-371**

COMPARATIVE ANALYSIS OF NATIONAL PLANS AND BUDGETS OF THE SAHELIAN COUNTRIES

Horenstein, N.R.
BLK Group, Inc.
1979, 194 p.

The low rate of return (53%) realized by Sahelian nations from their development plans makes imperative a careful analysis of plans and budgetary resources. This report presents such an analysis with the purpose of identifying trends for future planning. A key factor affecting investment realization rates is the heavy reliance by these nations on external financing. Shortfalls in the availability of foreign assistance have had a crucial impact on investment realization. In addition, there is the problem of mobilization of capital — a factor which varies considerably on a sectoral and subsectoral basis according to the particular donor institution. Another factor is the frequent revisions of investment levels. These upward and downward revisions are, in turn, related to such factors as inflationary pressures, availability of financing, changing donor priorities, etc. Until recently, the Sahelian nations have allocated substantial portions of their resources to industrial and urban development to the detriment of agriculture. Recent drought has made a change of emphasis even more critical. Mali, Niger, and Senegal are now devoting 24%, 32%, and 14%, respectively, of their rural sector allocations to herd reconstitution and to reversing

the deteriorating condition of the rangeland. Infrastructure investment is another priority need. For example, transporting food from surplus-producing areas is often difficult, if not impossible. As a whole, Sahelian nations have devoted relatively small amounts of funds to health, education, and other social services. Programs benefiting people directly, such as village-based health care and formal and non-formal education systems, are urgently needed. A review of annual budgets shows that overall expenditures are growing faster than revenues. This, in combination with a paucity of managerial and technical expertise, prevents these nations from assuming the recurrent costs of donor-financed projects. The remainder of the report consists of individual analyses of the plans and budgets of Gambia, Mali, Mauritania, Niger, Senegal, Upper Volta, Cape Verde, and Chad.

AID/afr-C-1199 GTS 625092900

058 **PN-AAH-742**

MANPOWER VS MACHINERY: A CASE STUDY OF CONSERVATION WORKS IN LESOTHO

Wykstra, R.; Eckert, J.
Colorado State University, Department of Economics.
1980, 26 p.

LASA Research Report No. 6

Four factors contribute to the grim employment situation facing Lesotho: the migration of the most productive portion of its labor force to South Africa; the projected growth of the present labor force by nearly 0.5 million by the year 2000, a prospect made worse by the likely return of current migrants; the high rates of underemployment in rural households; and expenditure of domestic income abroad, thwarting growth of domestic employment. A coherent employment strategy is sorely needed to stave off the effects of gross under- and unemployment. This paper propounds the use of labor-intensive over capital-intensive methods in conservation and other public works as a way of providing domestic employment — an argument supported by extensive cost-benefit comparisons and analyses of both methods. Using the results of an earlier analysis as augmented by new data on labor productivity and increased fuel prices, this paper first addresses labor-intensive costs. Data show that in labor-intensive operations substantial amounts of direct employment are created, while site overhead costs average about one-third of direct wage payments. Capital-intensive costs are presented in terms of the costs of heavy equipment, including those of operating machinery for 8 years (at 650 hr/yr, with an alternative analysis of 1,000 hr/yr); cost of replacement or depreciation; repair and maintenance; and other costs. Data compiled from the Thaba Bosiu Project indicate that the average conservation project using capital-intensive methods costs R360 and provides 10 man-days of employment per hectare. About three-fourths of this represents equipment costs, the rest being overhead and employment. Labor-intensive methods cost R68 less and provide 60 man-days of employment per hectare more than capital-intensive methods of construction. The analysis clearly demonstrates that a program of labor-intensive public works is a viable strategy for further developing Lesotho's infrastructure, as well as for contributing significantly to its employment objectives. An 8-page appendix detailing the underlying cost analysis, as well as extensive tables and equations, are provided in support of the authors' conclusions.

AID/ta-BMA-6; AID/ta-CA-1 632006400

059 **PN-AAH-871**

SOUTH AFRICAN MINE WAGES IN THE SEVENTIES AND THEIR EFFECTS ON LESOTHO'S ECONOMY

Eckert, J.; Wykstra, R.
Colorado State University, Department of Economics.
1980, 30 p.

LASA Research Report No. 7

During the period January 1973–June 1976, the mining industry of the Republic of South Africa increased mine wages by an unprecedented 500 percent to attract higher numbers of South Africans to mining jobs, thereby reversing South Africa's dependence on foreign labor. The economic impacts of such a reversal were severe, particularly in Lesotho, South Africa's prime source of migrant labor. This paper quantifies the more important of these impacts in order to identify the causes of major economic developments in Lesotho and to suggest the magnitude of economic difficulties that may occur if migration opportunities continue to diminish. The first section analyzes selected characteristics of Basotho migration for the period 1921–79. Possibly the most significant of these traits is that the male labor force available for agricultural employment in Lesotho is now at record levels, a situation worsened by the return of Basotho from South African mines. A detailed analysis is given of the magnitude of the shift in wages during the 1970's, which peaked in 1976 at levels 3–4 times higher than ever recorded. Selected impacts on Lesotho's national economy are analyzed with major conclusions being that migrant wages have severely distorted Lesotho's balance of trade; have contributed to increases in government revenues through the Customs Union; and have resulted in an almost 1:1 correspondence between increased income and imports. Impacts of these economic trends on livestock and agricultural production, consumption, and trade are discussed and figures are presented showing that mine wage increases caused net imports of nearly 100,000 animals annually and the abandonment of cultivation on some 50–60,000 ha. The final section suggests possible trends during the third Five Year Plan period. These include a significant decline in per capita wages, the need to offset negative growth rates in remittances with higher than normal domestic growth rates, and the possibility that a new incentive situation will gradually develop for household/farm decisionmakers. A 15-item reference list (1963–81) and the titles of other LASA research reports issued to date by the Lesotho Agricultural Sector Analysis Project are appended.

AID/ta-BMA-6; AID/ta-CA-1 632006400

060 PN-AAH-920

THE FUTURE ENVIRONMENT FOR AGRICULTURAL PLANNING 1980–2000 A.D.

Eckert, J.; Mohapi, J.N.
Colorado State University, Department of Economics.
1980, 33 p.

LASA Discussion Paper No. 9

Because the dominant factors affecting Lesotho's overall economic development are also those which affect the agricultural sector, characterization of these factors would provide agricultural planners with the economic environment around which their long-term programs and policies should be based. Providing such a characterization, this analysis predicts major problems confronting economic planners that may occur in the absence of a well-defined and implemented development strategy. The major economic, demographic, and institutional events expected to occur in Lesotho during the period 1980–2000 include the following: (1) an increase in population by 60%, and growth in the labor force and in rural households to nearly 1 million and 337,000, respectively; (2) a 50% decrease in migrant employment opportunities, resulting in requirements for a net addition of over 20,000 new domestic jobs; (3) extreme fluctuation in the amount of rainfall in the 1980's and 1990's which will substantially reduce crop yields; (4) completion of an extensive network of mountain and lowland feeder roads; and (5) the implementation of the Land Act of 1979 which will restrict land allocations to farmers already allocated land, increase the average size of operated farm units, and encourage investment through increased land tenure security. Without interventions to lessen the severity of these trends, the following course of events is predicted. The annual need for jobs will remain constant in the near future, exceeding the capacities of both the agricultural and commerce and industry sectors to provide employment. Unfavorable climatic conditions will depress agricultural production, which will in turn erode per capita agricultural incomes. Close analysis of the rural household situation reveals that economic disparity and a stratified social structure may evolve. The authors offer a broad number of recommendations in the areas of employment and income generation and distribution, and present pro's and con's of an economic dispersion strategy to halt foreseeable rural–urban migrations and urban plight. A 20-item bibliography (1963–80) is appended.

AID/ta-BMA-6; AID/ta-CA-1 632006400

061 PN-AAH-921

A CRITICAL ANALYSIS OF MANPOWER UTILIZATION ISSUES IN LESOTHO

Nchapi, M.F.
Colorado State University, Department of Economics.
1980, 52 p.

LASA Research Report No. 9

According to a recent study conducted by the Lesotho Agricultural Sector Analysis Project team leader, the supply of labor requiring employment within Lesotho's economy will increase to 900,000 persons between the years 1976 and 2000, with 93,000 agricultural jobs needed in the next 5 years and over 100,000 such jobs required in each of the following 5-year periods. Development of an effective manpower utilization strategy is thus crucial in solving Lesotho's employment dilemma. This paper reviews an agriculturally-based, employment-intensive theory of development and applies it to the case of Lesotho, critically examines existing data and analyses on the employment situation, and formulates broad policy implications for the Government of Lesotho. John Mellor, in his book *The New Economics of Growth*, defines an employment-oriented development strategy as one which places heavy emphasis on agriculture as the basis of employment generation. The elements of this strategy include giving priority to agricultural production through technological change suitable to conditions in developing countries; reducing capital requirements per employee in the industrial sector; increasing the growth rate of both exports and imports; and decentralizing administrative institutions. The author of this paper delves into the major dimensions of Lesotho's manpower utilization, thereby placing Mellor's strategy into context. These issues include rural–urban migration; the magnitude of labor surplus or shortage; migration into South Africa and miners' incomes; growth of the labor supply during the years 1980–2000; and labor-intensive technologies and labor absorption. It is demonstrated that while the agricultural sector must be developed as the primary employer of returning migrants, the industrial and public works sectors also have an important role in this regard. Recommendations are made in the areas of agricultural production and marketing, import and export substitution, expansion of industry from urban areas, distribution of improved social services to village people, transfer of technology to small farmers and local personnel, and the quantity and quality of training. A 16-item bibliography (1960–80) is appended.

AID/ta-BMA-6; AID/ta-CA-1 632006400

062 PN-AAH-747

THE SOCIOECONOMIC CONTEXT OF FUELWOOD USE IN SMALL RURAL COMMUNITIES

Wood, D.H.; Brokensha, D.; Castro, A.P.; Gamser, M.S.; Jackson, B.A.; Riley, B.W.; Schraft, D.M.
Devres, Inc.; A.I.D., Bureau for Program and Policy Coordination, Office of Evaluation.
1980, 318 p.

A.I.D. Evaluation Special Study No. 1

All successful community fuelwood programs must take into account the importance of local participation, consider the specific socioeconomic characteristics of the proposed location and its environs, and critically examine alternative plans and approaches. These are some of the major conclusions of this indepth report which examines the socioeconomic and environmental aspects of fuelwood use in developing countries and analyzes critical issues regarding this use. Fuelwood is defined as including firewood and charcoal and conclusions are detailed as to the sources, accessibility, harvest or production, distribution, and consumption of each. A description of community fuelwood programs in general is provided in the body of the text, while an annex is devoted to the discussion of specific fuelwood programs in India, South Korea, Nepal, Thailand, Indonesia, Nigeria, Ethiopia, Tanzania, the People's Republic of China, and Colombia. For those designing and implementing individual community fuelwood programs, guidelines are provided to resolve the following questions confronting such projects: (1) What goals can be achieved through community fuelwood programs? (2) Which types are most suited to a particular community? (3) How can these programs encourage local participation especially of women, who are the main participants in wood collection, distribution, and consumption? (4) What resources are required? (5) What are the management requirements? (6) What are the costs and benefits of such programs? Appendices include footnotes, a bibliography, terms of reference for study, organizations and individuals contacted, and the report's research methods. Additional appendices describe selected fuelwood programs and possible future fuelwood activities. An extensive bibliography (261 entries, 1922–79) includes topics on national or global deforestation, afforestation, fuelwood use, and several dissertations on energy, agricultural economics, and social issues.

AID/SOD/PDC-C-0187

063 PN-AAH-923

RAINFALL OSCILLATIONS IN LESOTHO AND THE POSSIBLE IMPACT OF DROUGHT IN THE 1980's

Eckert, J.
Colorado State University, Department of Economics.
1980, 25 p.

LASA Discussion Paper No. 10

T.G.J. Dyer and P.D. Tyson proved scientifically that rainfall over much of the "summer rainfall region" of southern Africa follows a pattern of regularly spaced wet and dry spells each 9–10 years in duration, a situation known as the "quasi 20-year oscillation" which has existed since 1841. If the pattern holds, southern Africa will enter a period of below-average rainfall in the 1980's, with potentially ominous implications for food production. This report examines closely the findings of Dyer and Tyson, especially as they pertain to Lesotho which is situated entirely within the "summer rainfall region" and which is now coming to the end of a wet spell. Research by the Lesotho Agricultural Sector Analysis Project confirms that the model derived by the two scientists is applicable to Lesotho, whose rainfall patterns have definitely exhibited the 20-year oscillation since 1945. The decrease in rainfall during this predicted dry spell will be most serious in southern Africa's summer months, November–February. Compared to average wet-spell rainfall, average yearly summer rainfall will decrease by 20% and winter rainfall by nearly 14%. Such a dry spell may affect both maize and wheat production severely because initial, moisture-sensitive stages of growth occur during November, which may be the month of least rainfall. Drought-resistant sorghum, however, will be only slightly affected. Watercourse levels will also decline. The Ministry of Agriculture should take the following steps to minimize the effects of the predicted dry spell during the 1980's: conduct research to improve farmer management of soil–plant–water interactions under indigenous farming conditions and test new tree and vine crops whose value per water unit is high; give priority to water conservation programs such as repair and maintenance of conservation structures; utilize the government's seed importation capacity to obtain and spread seeds of drought-resistant varieties; and seek a high level of technical assistance to identify needs and suggest optional forms for national water rights legislation. A 15-item reference list (1971–80), as well as average monthly rainfall observations made at district headquarters stations, are appended.

AID/ta-BMA-6 632006400

064 PN-AAG-972

DRAFT ENVIRONMENTAL REPORT ON THAILAND

Library of Congress, Science and Technology Division.
1979, 94 p.

Sponsored by A.I.D. through the U.S. National Committee for Man and the Biosphere

Located in the heart of Southeast Asia, Thailand's 46 million people make it one of the world's 20 most populous countries. This draft report profiles Thailand's natural and environmental resources and many of its environmental problems. An overview is provided of natural resource- and environment-related organizations and legislation and of the country's population and economy. Maps, figures, and tables add detail to this information. Although highly variable, Thailand's water resources are generally abundant. Surface waters, however, are being polluted by municipal, industrial, and mining wastes. Clearing of upstream forests is increasing sedimentation in waterways, while critical watersheds, especially in the northern region, are being disturbed by loss of vegetation due to shifting cultivation. Heavy rainfall has leached the soil

throughout Thailand, causing high acidity and low fertility levels. In addition, mining practices (particularly the exploitation of tin and tungsten) and shifting cultivation contribute to erosion and the loss of topsoil. Forests are being depleted rapidly, especially in the northern highlands and in the northeast, due to the practice of shifting cultivation by both the local population and seminomadic hill tribes. Unmanaged development of the coastal zone has led to deterioration of its ecosystem, especially on the Gulf. Mangrove forests are suffering from indiscriminate logging for charcoal, encroachment by fishing and mining industries, water pollution, and increased sedimentation. Illegal use of dynamite by fishermen and siltation from mining activities endanger the coral reefs. Illegal hunting and trapping and habitat destruction through forest clearing are destroying wildlife at a rapid rate. Although fish is the principal source of animal food and the only significant source of protein in the national diet, freshwater and marine fisheries are overexploited. Despite the passage of the Enhancement and Conservation of National Environmental Quality Act in 1975 and the formation of the National Environment Board, there remains a lack of coordination between government agencies responsible for resource management. A 46-item bibliography (1969–79) is included.

SA/TOA 1-77 931111300

065 **PN-AAG-973**

DRAFT ENVIRONMENTAL REPORT ON SRI LANKA

Library of Congress, Division of Science and Technology.
1978, 71 p.

Sponsored by A.I.D. through the U.S. National Committee for Man and the Biosphere

Opportunities for developing Sri Lanka's water, forest, and soil resources exist, but such development must proceed rationally in order to prevent a recurrence of environmental deterioration. This report surveys the country's renewable resources (water, forest, wildlife, fisheries, and the atmosphere) and nonrenewable resources (minerals, soil, and coastal land) and cites potentialities and problems in the island's two climatic zones, the wet zone to the southwest and the dry zone covering the rest of the island. Key points are illustrated by maps, tables, and figures. Overviews of the economy, demographic trends, concerned governmental and private agencies, and environmental legislation are also provided. The major environmental problems which occur primarily in the wet zone, are deforestation, lack and misuse of water resources, and soil erosion. Deforestation has resulted from clearing land for agricultural enterprises, increased firewood demands, development of the timber industry, and the need for construction materials. The ramifications of the rapid pace of deforestation include endangerment of primary forest land and its natural ecology and loss of habitat for wild animals. A particularly serious form of deforestation has been the loss of forests significant for their water-holding capacity, resulting in flooding and increasing soil erosion, especially in areas of high elevation. In these elevated areas, hot air rising from deforested lands has increased droughts during intermonsoonal periods. Excessive irrigation for certain crops in the wet zone and the lack of a more efficient irrigation system in the dry zone are traditional problems. In addition, severe droughts have occurred in recent years with the failure of the monsoon rains, thus exacerbating the problem of water resources. Although legislation protecting the environment and natural resources exists, problems regarding its administration and enforcement remain. An appendix on animals protected under the Fauna and Flora Protection Ordinance and a 17-item bibliography (1961–77) in English and German are included.

SA/TOA 1-77 931111300

066 **PN-AAG-974**

DRAFT ENVIRONMENTAL REPORT ON PERU

Library of Congress, Division of Science and Technology.
1979, 137 p.

Sponsored by A.I.D. through the U.S. National Committee for Man and the Biosphere

Although Peru is committed to the rational development of its natural resources, economic expansion has generated environmental problems. This report analyzes the current status of Peru's air, mineral, water, soil, wildlife, fishery, and coastal resources in conjunction with topographic and climatic data. Agencies responsible for developing environmental legislation are discussed, and extracts from the 1979 draft constitution pertaining to natural resources are presented along with an economic profile and demographic data. Nine environmental problem areas are cited. (1) Population growth has averaged 3%, with population densities highest in the Sierra and Costa regions. Half the population — mostly in rural areas — lives in poverty, under poor health conditions. Urban centers such as Lima are unable to supply adequate services or employment opportunities, exacerbating poverty and disease. (2) Water resources are available, yet population settlements and economic activity are located in areas of limited water supply, thus requiring expensive delivery and irrigation systems. Pollution, due to dumping of municipal and mine wastes, threatens these supplies. (3) Many soil areas are considered suitable only for grazing and forestry, and the limited agricultural soils have been overworked, particularly on the Costa and Sierra slopes. Desertification, soil erosion, and salinity are dominant problems. (4) The Sierra and the Costa have been heavily deforested as a result of timbering and fuelwood needs. Mahogany, tornillo, and Spanish cedar have been eliminated as resources in some areas. (5) Wildlife numbers have declined, and the chinchilla and vicuna are endangered. (6) Peru's coastal waters are subjected to pollution from municipal, industrial, and mining wastes. (7) Heavy fishing and water pollution from mine tailings and municipal wastes have prevented the recovery of the anchovy fishery. (8) Air and water pollution from extraction of Peru's major minerals — copper, iron, silver, lead, and zinc — has increased. (9) Although numerous environmental laws exist, enforcement is inadequate. A 96-item (1960–79) bibliography written in English, German, and Spanish is appended.

SA/TOA 1-77 931111300

067 **PN-AAG-975**

DRAFT ENVIRONMENTAL REPORT ON NEPAL

Chakroff, M.S.
Library of Congress, Science and Technology Division.
1979, 61 p.

Sponsored by A.I.D. through the U.S. National Committee for Man and the Biosphere

By 1988, Nepal may lose its most precious natural resource — its forest lands. According to satellite data, Nepal's forest lands declined from 30% to 22% of its total land area in the last decade. This draft report reviews the natural resources and related legislation and institutions of this small, land-locked country, located between northern India and Tibet, and identifies its major environmental problems. The latter include deforestation and the related problems of reduced agricultural productivity, impure drinking water, and soil erosion. Nepal's forests can yield only 77.9 kg of the 546.3 kg of fuelwood currently consumed per person per year, an annual deficit of 6.5 million tons of wood. Because of the diminished firewood supply, people forego heated meals and consume impure water. Also, by burning manure for fuel, they deprive the land of needed nutrients. Marginal lands cleared for agricultural production are abandoned as productivity falls, leaving topsoil a prey to torrential rains. Each year, 240 million cubic meters of topsoil are lost due to the Himalayas' topography and to poorly planned development activities and construction. The loss of topsoil, reduced agricultural usage of fertilizer, and poor farming practices contribute to the recent 2-year decline in agricultural productivity. Nepal's three major rivers have not been fully utilized as hydro-energy sources, nor has potable water been provided to reduce the people's exposure to contaminated water. Despite its considerable legislation regulating forest usage, the government has done little to reforest the areas used for export purposes. An underlying cause of Nepal's environmental problem is the country's high population growth rate. Nepal's present population is 13.8 million, with an annual growth rate of 2.5%. According to some estimates, Nepal will have a population of 22 million by the year 2000. In 1978, no more than 5% of the couples 15-44 years of age accepted contraceptives and only 35% of married couples continued contraceptive usage after initial acceptance. This continually expanding population makes ever-growing demands upon diminishing resources. A 32-item bibliography (1970–79) is appended.

SA/TOA 1-77 931111300

068 **PN-AAG-977**

DRAFT ENVIRONMENTAL REPORT ON MAURITANIA

Library of Congress, Science and Technology Division.
1979, 43 p.

Sponsored by A.I.D. through the U.S. National Committee for Man and the Biosphere

An extended drought, aggravated by population pressures, threatens the traditional agricultural base and fragile environment of Mauritania with rapid desertification. This report assesses Mauritania's overall environmental situation, focusing on its population, its government's environmental organizations, environmental legislation, natural resources, and the environmental effects of its economy. Mauritania occupies a territory about 80% of the size of Alaska, ranging from the northern, hot, arid Sahara deserts to the fertile, green banks of the Senegal River in the south. The current loss of grazing and subsistence farm lands originated with the Sahelian drought that began in the early 1970's. Contributing to the problem was the extension of agriculture to marginal lands previously used for grazing; clearing the areas of their natural vegetation left them unprotected after the crops failed. The growth of livestock herds, made possible by expanded groundwater consumption, led to the conversion of forest areas into grazing areas and the exhaustion of all vegetation. The drought drove the nomadic herders to strip forests to feed their starving livestock; many of the herds died, leaving Mauritania's largest societal group without a livelihood. They were forced to migrate to urban areas where they live in squalor, posing a major problem for the government. Many forests did not survive these amputations and perished as a result. Deforestation is also due to firewood collection near expanding urban areas and the clearing of forests for agricultural expansion. The problem of rapid desertification is thus quite serious, considering the limited amount of fertile soil (40% of the country is covered with sand). The restoration of the delicate environmental balance that characterized this country's past is essential to its future survival. Despite the government's progress in this area (regulating forest use, proposing projects to begin nurseries and village forests, regenerating forest stands and constructing windbreaks), its future actions are hard to predict due to the political uncertainty lingering from the July, 1978 coup d'etat. Appended is a 12-item French and English bibliography (1965–77).

SA/TOA 1-77 931111300

069 **PN-AAG-978**

ENVIRONMENTAL PROFILE OF LIBERIA, PHASE I

Hazelwood, P.T.
Library of Congress, Science and Technology Division.
1980, 53 p.

Sponsored by A.I.D. through the U.S. National Committee for Man and the Biosphere

Liberia has a tropical climate favoring high forest vegetation and is rich in natural resources, notably iron ore, timber, and rubber. Its major topographical and biogeographical regions include a coastal plain, a belt of rolling hills, a belt of low mountain ranges and plateaus, and northern highlands. This report is a preliminary review of information available in the United States on Liberia's environment and natural resources. Topics covered by the report include the nation's physical, demographic, and social and economic characteristics; renewable resources; non-renewable resources; parks, reserves, and other protected areas; and environmental problems. Increasing pressures are being placed on Liberia's renewable resource base. Under shifting cultivation, the

dominant form of agriculture, much if not most of the country's primary forests have been reduced to secondary forests or have been completely cleared. Logging by timber concessions and fuelwood demands constitute the other major causes of forest degradation. Mining is the most important sector of Liberia's economy. Iron ore production, which accounts for 60–70% of total export earnings, has resulted in the pollution of the Mano and St. John rivers from iron ore dust and other residues. In addition, Liberia's coastal waters are becoming increasing polluted — the result of spillage from oil tankers, oil cargo handling and off-shore drilling of petroleum. Poor sanitation, however, is the primary environmental factor affecting public health. Sanitary piped water, waste water and sewage treatment plants, and sanitary disposal of human waste occur rarely. Monrovia is the only city in Liberia with a sewage treatment system. Overall, Liberia's primary environmental problems include: (1) deforestation; (2) pollution resulting from mineral exploitation; (3) unregulated urban expansion; (4) rural water supply and sanitation; and (5) a lack of legislative and institutional mechanisms necessary for environmental management. References (59 entries, 1931–80) and appendices (consisting of demographic, social, and economic data; lists of soils, vegetation, and endangered animal species; and a biogeographical map) are provided.

SA/TOA 1-77 931111300

070 **PN-AAG-979**

DRAFT ENVIRONMENTAL REPORT ON JORDAN

Bauman, F.
Library of Congress, Division of Science and Technology.
1979, 103 p.

Sponsored by A.I.D. through the U.S. National Committee for Man and the Biosphere

Jordan is not endowed with abundant natural resources. Only 9% of the land is cultivable and forests cover less than 1% of the country. Wildlife has been decimated by overhunting, and mineral resources are few, although phosphates are growing in economic importance. This draft report profiles Jordan's natural resources including water, forests, soils, wildlife, fisheries, beaches, minerals, and atmosphere. Organizations related to the environment are listed in light of their responsibilities, and legislation relevant to each resource is described. Demographic and economic data are also provided. Jordan has several major environmental problems. (1) Water resources for human consumption and irrigation are few, a situation exacerbated by frequent droughts. Inadequate water supplies and sanitation facilities are major contributors to gastroenteric diseases as well as infectious hepatitis, typhoid, and dysentery. In Amman, most dwellers rely on tank trucks for water delivery. A survey of 747 other communities established that only 1.5% have satisfactory potable water supplies for 80% of their residents. Most of Jordan's municipal water systems are in poor condition and incur water losses of 25–60%. A heavy concentration of industry in the crowded urban area of Amman-Zarqe is causing water pollution problems. (2) Deforestation has been accelerated by agricultural clearing, fuelwood exploitation, and overgrazing which have caused soil erosion, loss of valuable timber resources, and damage to watershed areas. (3) Soil erosion due to deforestation, overgrazing, and irresponsible farming practices (especially in upland areas where wheat, Jordan's main crop, is grown) has led to reduced land productivity and the siltation of reservoirs. In the catchment area for the King Talal Reservoir, 95% of the land is affected by sheet erosion. Excess salinity is also a problem which frequently accompanies irrigation. The southern borders of the Zarqa River are particularly subject to this problem. This poor environmental picture is reflected in the generally low level of health of Jordan's people. A 56-item bibliography (1964 –79) is appended.

SA/TOA 1-77 931111300

071 **PN-AAG-980**

DRAFT ENVIRONMENTAL REPORT ON HAITI

Library of Congress, Science and Technology Division.
1979, 61 p.

Sponsored by A.I.D. through the U.S. National Committee for Man and the Biosphere

Haiti's current, almost unparalleled environmental degradation is due to interrelated problems of overpopulation, deforestation, and soil erosion. This draft environmental report assesses Haiti's environmental problems, natural resources, economy, and the Government of Haiti's (GOH) environmental agencies and legislation. The resource demands of Haiti's population of 4.8 million, with an annual 2.2% growth rate, lead to the extended farming of marginal, easily erodible lands, and the stripping of forests for fuel. Haiti is the most densely populated country in the Western Hemisphere, estimated in 1978 to have 178 people per sq km, yet the GOH has not supported the family planning programs initiated by international donor agencies (who themselves need greater coordination and cooperation). Deforestation, the farming of marginal lands, and slash-and-burn agriculture cause Haiti's chief environmental problem: soil erosion. Haiti's strong rains wash nutrient soils off farmed hillsides and down into the dams and irrigation works, where the accumulated silt renders irrigation systems inoperable and reduces dams' hydroelectric potential. In addition, soil erosion causes reduction of fish populations through high alkalinity in lakes, ponds, and rivers, and decreases agricultural output as farmers must till deeper, less fertile soil. GOH studies estimate that although 55% of the country should normally be forested, Haiti's forests have been reduced to 7–9% of the land area. This deforestation is due to the clearing of forests for commercial lumber, firewood and charcoal (90% of the current wood use), and additional farmland, which is then farmed by common slash-and-burn methods. GOH hopes to increase its forests to 18.5% of the total land area and has accordingly passed legislation banning timber exports, requiring that cut trees be replaced with new ones, and directing local governments to plant communal forests in eroded mountain areas. GOH will also seek alternative energy sources to meet growing energy demands and will give special attention to reforesting hydrological basins. Appended are a 29-item French

and English language bibliography and a list of Haitian birds protected in recent legislation.

SA/TOA 1-77 931111300

072 **PN-AAG-981**

DRAFT ENVIRONMENTAL REPORT ON GUATEMALA

Library of Congress, Science and Technology Division.
1979, 99 p.

Sponsored by A.I.D. through the U.S. National Committee for Man and the Biosphere

As a first step in assisting development planners in Guatemala to identify critical areas of environmental concern, this draft report profiles the status of Guatemala's natural resources. Indigenous resources investigated include water sources, forest areas, soils, wildlife, coastlands, beaches, fisheries, and minerals. Government and non-government agencies which deal with environmental issues are discussed in light of their responsibilities; environmental regulations are enumerated in detail. Demographic information is also provided with the aid of maps and charts. A general economic profile highlighting both industrial and agricultural production concludes this report. Five major environmental problem areas are noted. (1) The most serious problem is deforestation which, since 1890, has occurred in over 50% of the nation's forests. Inadequate forest management in conjunction with increasing population pressures in the highland regions have accelerated this process. (2) Since the turn of the century, 40% of the land's productive capacity has been lost due to erosion. Aggravated by the existence of a predominantly steep-sloping geography, in addition to deforestation and poor soil conservation techniques, erosion is a serious problem in the cultivated western highland areas. (3) Water pollution presents a great hazard as a result of the concentration of population in areas with inadequate waste disposal systems and increases in surface runoff because of barren ditches. (4) The use of pesticides such as DDT, Dieldrin, Toxaphene, Methyl and Ethyl parathion, and Endrin in cotton growing areas has dramatically increased. Application procedures, particularly aerial spraying, have been inadequate in providing safety measures and as a result these toxic sprays have been polluting major water sources and are being transmitted in food chains. (5) At the present growth rate of 3.3%, the nation's population will double in 22 years, straining available resources, particularly in urban areas, in addition to encroaching upon the surrounding natural habitats of wildlife. A 50-item (1968–79) bibliography in English, German, and Spanish is appended.

SA/TOA 1-77 931111300

073 **PN-AAG-982**

DRAFT ENVIRONMENTAL REPORT ON BOLIVIA

Library of Congress, Division of Science and Technology.
1979, 76 p.

Sponsored by A.I.D. through the U.S. National Committee for Man and the Biosphere

Bolivia is a landlocked nation whose topography is an important factor in considering its environmental problems. With the help of maps and charts, this draft report elaborates upon this relationship while profiling the nation's water, soil, mineral, wildlife, fishery, and forest resources. The responsibilities of relevant organizations and standing legislation concerning the development of natural resources are outlined. Population data and economic information are also provided to demonstrate how their growth patterns have been defined by the environment. The concentration of people living in the unproductive Altiplano region has taxed the area's available services. Soil suitable for agricultural use is limited and poor cultivation methods and overgrazing have accelerated erosion. This process, compounded by desertification in the highland and valley areas, has led to poor water retention, which increases runoff. The result is serious flooding in the lowland areas. In the farming regions of Santa Cruz, slash-and-burn agricultural practices also promote erosion and the abandonment of farm land. Potable water supply is also a problem. Poor water quality caused by urban waste and mining residue, particularly in the Altiplano, has been responsible for the spread of various diseases. Deforestation is another growing concern. Tropical areas of the northern lowlands have been subjected to increased timber exploitation. Deforestation for agricultural purposes is also accelerating, especially in the Santa Cruz district. Generally, Bolivia's wildlife is still varied and plentiful. However, some native species such as the vicuna are on the verge of extinction. The Bolivian Government has initiated efforts to resolve these problems with the establishment of the Division of Natural Resources and Environmental Protection. But limited manpower and funding continue to limit progress in this area. A 40-item bibliography (1964–79) in English and Spanish is appended.

SA/TOA 1-77 931111300

074 **PN-AAH-752**

DRAFT ENVIRONMENTAL REPORT ON INDIA

Bauman, F.
Library of Congress, Science and Technology Division.
1980, 175 p.

Sponsored by A.I.D. through the U.S. National Committee for Man and the Biosphere

Many of India's environmental problems arise from attempts to meet the basic needs of its enormous population for food and energy. This draft report profiles India's environment and natural resources in order to specify these problems. After an introductory section on the distribution and characteristics of India's population, basic descriptions are provided of the country's topographical and geological characteristics and of such natural resources as climate, water, soils, forests, wildlife, coastlands and beaches, fisheries, minerals, and air and the atmosphere. Concluding sections deal with the nation's economy, with emphasis on the agricultural, industrial, and energy sectors; the governmental, research, higher education, and private organizations which deal with environmental issues; and current environmental legislation. India is faced with the following environmental problem areas. (1) Water resources are in short supply in regions such as the Deccan Plateau due to dry seasons and the lack of adequate storage

facilities. In addition, poor surface water irrigation has resulted in waterlogging and water loss, while some areas experience annual flooding periods. Domestic waste and runoff containing pesticides and fertilizers have contributed to water pollution. Groundwater problems include overpumping, salinity, and pollution due to seepage from fertilizers and pesticides. (2) Soil damage has occurred in 20% of India's soils through the presence of salinity and alkalinity, acidity, waterlogging, cracking, and erosion. (3) During the past 20 years, 4.0 million ha have been deforested — in a country that had 74.9 million ha of forest area in 1978. Continued recession of India's forests is due to clearing, fuel needs, fires, and grazing. (4) Great loss of wildlife has occurred due to urban and rural encroachment; there exist 25 endangered species. (5) Fisheries have been overexploited. (6) Coastal zones have experienced sea erosion and marine pollution. (7) Air pollution is most pronounced in urban centers, although rural regions have been subjected to similar problems as a result of the burning of wood and dung. A 93-item bibliography (1960–79) is appended.

SA/TOA 1-77 931111300

075 **PN-AAH-753**

DRAFT ENVIRONMENTAL REPORT ON THE PHILIPPINES

Chakroff, M.S.
Library of Congress, Science and Technology Division.
1980, 77 p.

Sponsored by A.I.D. through the U.S. National Committee for Man and the Biosphere

The Republic of the Philippines is an archipelago composed of an estimated 7,100 islands located along the southwest rim of Asia. This environmental report is a profile of the Republic's indigenous natural resources including climatic factors, water and energy sources, forests, seismic activity, soils, wildlife, minerals, and coasts and beaches. In addition, government and nongovernment agencies involved with environmental issues and legislation are described. The Philippines is plagued by a number of environmental problems. (1) Deforestation and soil erosion have increased. An estimated 5 million hectares of forest lands have been leveled, of which 1.4 million ha had been located in critical watershed areas. Deforestation is progressing at a rate of 80,000 ha per year. Although the Government does require replanting by loggers, enforcement is inadequate. Erosion is excessive in Cebu, Luzon, Masbate, Panay, and Bohol. (2) Water and air pollution are an increasing health hazard. Industrial waste is a serious problem in Manila and surveys indicate that 38 rivers are currently being polluted by industry. Sources of this pollution are mining operations, sugar mills, food processing plants, breweries, distilleries, and factories producing plastics, paper, detergents and chemicals. The National Pollution Control Commission (NPCC) has recently begun fining offenders. The NPCC has also initiated clean air campaigns directed at motor vehicles, but little has been done regarding industry. (3) The loss of natural habitats continues unabated. Important as coastal buffers and fish habitats, the reefs have been damaged by both eroded river silt and fishermen's dynamite. Approximately 50% of the coral reefs surrounding the Philippines are either dead or dying. Mangrove swamps have also been dramatically reduced due to cutting for forest products, thus eliminating the protective function swamps provide for fish and shellfish. Generally, there has been little environmental management of these areas. A 16-item bibliography (1965–79) is appended.

SA/TOA 1-77 931111300

076 **PN-AAH-754**

DRAFT ENVIRONMENTAL PROFILE OF SWAZILAND

Library of Congress, Science and Technology Division.
1980, 105 p.

Sponsored by A.I.D. through the U.S. National Committee for Man and the Biosphere

Swaziland is a nation with both abundant natural resources and serious environmental problems. This report assesses Swaziland's environment after first presenting an extensive overview of the topography, health, education, climate, religion, and economy of this landlocked nation. Five main problems burden the natural environment. The first, deterioration of arable and communal grazing lands, has two main causes: overstocking of livestock, and the fact that much of the arable land is on steep slopes, making it prone to erosion. To remedy this, destocking programs combined with crop development programs are recommended. Mandatory strip cultivation, contour plowing, and cultivation over 100 feet from river banks are also required. The second problem, the high incidence of waterborne diseases such as bilharzia, is especially common in the many surface water and irrigated areas of Swaziland. Major programs to eradicate these diseases include eliminating the host snail population and providing clean water and sanitary facilities. Because the expanding activities of a growing population alter the natural environment — the third problem — strong national development planning is needed to conserve plants and animals in their natural ecosystems. To this end, the National Trust Commission has been established and 31 sites designated for nature reserves. A fourth problem, rapid urbanization, has led to shelter and environmental health problems due to inaccessible potable water and sanitation facilities, especially in squatter settlements on the urban fringe. In some cases, building these settlements has been prohibited around endangered watersheds, but physical planning and environmental controls are still needed around urban centers. The final problem, Swaziland's high rate of population growth (3.0 to 3.2%), places great pressure on land resources. The Government is attempting to deal with this problem through maternal and child health/family planning programs. Attached are technical appendices, a 38-item bibliography (1961–79), and a list of organizations and legislation relevant to natural resource management.

SA/TOA 1-77 931111300

077 PN-AAH-874

DRAFT ENVIRONMENTAL REPORT ON MOROCCO

Parker, S.A.
University of Arizona, Office of Arid Lands Studies, Arid Lands Information Center.
1980, 96 p.

Sponsored by A.I.D. through the U.S. National Committee for Man and the Biosphere

Desertification due to accelerating population growth rates and heavy dependence on agriculture has become a growing threat to the economic and ecological balance of many developing countries. To address this situation, environmental investigations, such as this draft environmental report of Morocco, are urgently needed. The report consists of an introductory description covering Morocco's geography, population, and economic characteristics, followed by an examination of the country's environment and natural resources, including flora, mineral resources, soils, water resources, legislation governing the environment and natural resources, and relevant organizations. In addition, demographic and economic characteristics are enumerated in various tables, and maps are presented to illustrate geological, vocational, and agricultural features. Currently, Morocco is confronted with a number of environmental problems. Population increases and pollution from urban sewage and oil are straining the environment. Soil erosion has accelerated due to overgrazing and poor water management practices. Vegetation denudation has resulted from grassland and forest destruction. Inappropriate water management practices used in irrigation projects have caused silting of reservoirs and indirectly increased the incidence of malaria and bilharzia. Ignorance of small-scale water management methods has resulted in watershed destruction while loss of habitat and other hunting pressures have caused widespread wildlife destruction. Morocco has environmental legislation that addresses some of these problems, but overcoming resistance to changing traditional land use practices destructive to the environment poses perhaps the greatest obstacle to enforcement. Appended is an extensive bibliography of English and French sources on Africa (1954–75) and Morocco (1960–78), as well as on development (1964–78), environment and natural resources management (1960–79), fauna and flora (1967–78), geology (1963–79), mineral resources (1947–79), range management (1966–78), soils (1968–77), and water (1967–79).

SA/TOA 1-77 931111300

078 PN-AAH-875

DRAFT ENVIRONMENTAL REPORT ON YEMEN (YEMEN ARAB REPUBLIC)

Speece, M.
University of Arizona, Office of Arid Lands Studies, Arid Lands Information Center.
1980, 98 p.

Sponsored by A.I.D. through the U.S. National Committee for Man and the Biosphere

The Yemen Republic is one of the least developed countries in the world. Lacking substantial mineral resources, its primary resources are its limited agricultural and rangelands of which only 8% are definitely cultivable. This draft report presents a profile of the country's natural and environmental resources in order to identify major environmental problems. After an introduction outlining Yemen's geographical, climatic, and demographic characteristics, the country's natural resources of water, minerals, soils, vegetation/rangelands, and fauna are described, along with a note on parks, protected areas, and reserves. A review of Yemen's environmental problems — which the Government is only now beginning to recognize — reveals that they are generally related to water or agriculture. Five major problems are noted. (1) The pollution of drinking water is serious in both rural and urban areas. Existing wells are shallow and therefore easily contaminated, a situation compounded by the lack of waste disposal systems. (2) Since most of Yemen suffers from scant rainfall and little surface water, groundwater is the major source of water for household use. Increases in this use and in groundwater irrigation are rapidly lowering the water table in many regions. (3) Soil erosion, always a problem in wadi areas, is now spreading to highland agricultural areas. The depletion of plant cover in range and woodlands has also accelerated erosion in nonagricultural areas. (4) Soil salinization is a problem in Tihama, where irrigation with groundwater is increasing. (5) Other difficulties that are not yet considered critical include spreading sand dunes in Tihama, overgrazing and depletion of range plant cover, soil depletion, and problems associated with rapid industrialization. Appended is a 180-item bibliography of German, French, Italian, and English sources covering general information (1872–1978); geology, minerals, and soils (1888–1977); flora and fauna (1834–1955); water resources and management (1925–77); land use and agriculture (1953–78); public health and nutrition (1932–72); social aspects (1939–79); and development (1964–79). A 27-item (1939–80) list of references cited is also included.

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079 PN-AAH-876

DRAFT ENVIRONMENTAL PROFILE ON TUNISIA

Grant, A.P.
University of Arizona, Office of Arid Lands Studies, Arid Lands Information Center.
1980, 77 p.

Sponsored by A.I.D. through the U.S. National Committee for Man and the Biosphere

Intensified by the country's continuing population increases, the major problem burdening Tunisia today is a swiftly eroding landbase. This report of the natural resources of this small, arid country emphasizes major environmental problems, legislation already passed for environmental protection, and provides recommendations to reverse environmental degradation. After brief remarks on farming practices in Tunisia, the impact of the population's growing migration to urban centers upon agriculture, industry and the economy is discussed. The survey of the country's water, soils,

land, wildlife, and mineral resources reveals several critical problems. Water resources, of which groundwater is the main constituent, are being depleted by the sharply increased withdrawal of groundwater for irrigated areas and by the growing needs of industry and households. In the absence of adequate water quality control systems, this growing use has increased the salinity, sedimentation, chemical, and fecal content of the country's waters. The landbase, another object of rapid depletion, is being eroded mainly by disturbance of the vegetative cover through improper cropping and overgrazing of livestock. The Tunisian government has recognized the dangers confronting the country's natural resources and has passed protective legislation to stabilize coastal and continental sand dunes by establishing forests and by developing a transnational zone with ecosystem protection devices such as conservation farming and carefully managed rangeland. Additional activities recommended to counter erosion include: contour plowing on steep slopes; crop rotation; strip cultivation; terrace construction; avoidance of grazing in the growing season; and reduction of animal numbers. Although these activities will reduce natural resource depletion, the biggest problem will be meeting the population's growing needs for land and water and at the same time, encouraging them to adopt prudent practices to sustain Tunisia's natural resources. Lists of environmental protection legislation and organizations, literature cited, supporting bibliographies (1969–79), and technical appendices are attached.

SA/TOA 1-77 931111300

080 **PN-AAH-877**

DRAFT ENVIRONMENTAL REPORT ON ARAB REPUBLIC OF EGYPT

Wilkinson, M.J.
University of Arizona, Office of Arid Lands Studies, Arid Lands Information Center.
1980, 115 p.

Sponsored by A.I.D. through the U.S. National Committee for Man and the Biosphere

Current environmental problems facing Egypt are caused by the concentration of intensive agricultural irrigation and high population densities on 4% of the nation's land area. This draft report reviews Egypt's natural resources in light of these problems. An introduction describes the nation's geography, climate, and population. The body of the report analyzes Egypt's natural resources of minerals, water, soil, flora and fauna; and the impact on these resources by irrigation projects, land reclamation, dust storms, and industry. A brief final section lists the country's major environmental problems and strategies to counter them, as follows: (1) Irrigation-induced salinization has damaged almost 30% of Egypt's irrigated soils. Dust storms and urban sprawl have also hurt soils. Suggested countermeasures include drainage of waterlogged areas; prevention of canal seepage; regulation of water systems to prevent resalinization and rewaterlogging; rangeland improvement and soil surveys; and protection of land from urban encroachment. (2) Pollution of surface and groundwater has resulted from salinized drainage water from irrigated areas, agricultural pesticides, sewage disposal, industrial effluence, and overpumping of aquifers. Improved sewage disposal systems are essential, along with enforcement of water quality regulations and control of agricultural chemicals. Research on groundwater beneath the western desert oases and the localized salinization of groundwater in the Delta region on larger groundwater bodies is also recommended. (3) The spread of endemic waterborne diseases through the irrigation system has increased health hazards. Improved water supply and sewage systems, as well as better irrigation practices, are required. (4) Perennial irrigation has increased the number of crop-destroying pests. Monitoring of current controls is needed to detect and prevent epidemic outbreaks. Also recommended are the creation of protected areas for endangered wildlife and development of an integrated environmental policy. Included is a 75-item bibliography (1935–79) and seven appendices, including a list of recent USAID projects.

SA/TOA 1-77 931111300

081 **PN-AAJ-124**

DRAFT ENVIRONMENTAL REPORT ON BANGLADESH

Library of Congress, Division of Science and Technology.
1980, 104 p.

Sponsored by A.I.D. through the U.S. National Committee for Man and the Biosphere

Bangladesh is one of the most densely populated countries in the world — a situation that has placed tremendous pressures on its natural resource base. This draft report discusses the nation's plight while profiling its resources of water, soils, forests, wildlife, coastlands, fisheries, and minerals, as well as its climatic and geographic characteristics. Complementing these resource profiles are examinations of the country's environmental organizations and legislation, and its demographic and economic characteristics. Overpopulation is the critical problem confronting Bangladesh; there is an immediate need to slow the nation's 2.9% growth rate. Due to the nation's limited water storage facilities, only 10% of the population has access to potable water despite the overabundance of water during the monsoon season. This situation contributes to low agricultural productivity and the rapid spread of communicable diseases. About 50% of the population suffers from malnutrition in addition to intestinal diseases and parasitic maladies such as malaria. The most prominent water quality problem is contamination of domestic water by human waste. Water is also contaminated by fertilizer and pesticide residues and industrial wastes, especially in the southeast and around Dacca. Farming area is also inadequate. Since most arable lands are already under cultivation (thus severely limiting the area for grazing), increased agricultural output depends on expanded irrigation operations and the use of fertilizers and pesticides. Soil erosion caused by monsoon flooding and hill farming is continuous. Deforestation, due to fuelwood gathering and agricultural clearing, has left only 15% of the nation's forests intact. Wildlife has also suffered as society reduces their habitat. Rhino-

ceri, elephants, and crocodiles are endangered. Coastlands are inundated by saline waters, while exploitation of mangrove swamps in the southwest for fuelwood threatens the area's ecological patterns. The nation's fishery and mineral resources are considered underdeveloped. A 33-item bibliography (1971–79) in English and German is appended.

SA/TOA 1-77. 931111300

082 **PN-AAJ-125**

DRAFT ENVIRONMENTAL REPORT ON ECUADOR

Library of Congress, Science and Technology Division.
1979, 63 p.

Sponsored by A.I.D. through the U.S. National Committee for Man and the Biosphere

Ecuador, a mountainous country on the northwest coast of South America, is currently developing its territories east of the Andes mountains. Exploitation of natural resources, particularly oil, is an important incentive in these development activities. This draft report examines the status of Ecuador's environment and climate, water, forest, soil, wildlife, petroleum, and mineral resources, with key points illustrated by charts and maps. Also provided are overviews of the country's demographic characteristics and of the government's environmental agencies and current environmental legislation, as well as a brief description of the country's economy. Ecuador is faced with three main environmental problems. (1) Natural erosion occurs as the Andes' mountain rivers cut gorges into the countryside. This process is furthered in the highland areas of the Sierra by overgrazing, uncontrolled cultivation, and deforestation. As population increases force farmers higher up the mountain slopes, areas cleared for farm use exacerbate erosion. Improved conservation methods and agricultural production on the lower slopes and better pasturage and forage crops for livestock could help to arrest this process. (2) Deforestation, accelerated by government efforts to colonize the area and by petroleum exploration in the northeast, is most evident in the Orient, the virgin tropical rain forest that occupies over half the country's territory.

Too often, mountain ranges best suited for forestry are deforested for colonization. Subsequent overgrazing and uncontrolled cultivation can result in soil erosion as seen here in the Andes of South America.

Government policies to encourage logging have also contributed to this problem because loggers often fail to replant in cleared-out areas. (3) Desertification has increased by 31.5% over the last 25 years. Most of the arid land is along the southern coast and border with Peru, but the Santa Elena peninsula is also considered arid. Deforestation and erosion both contribute to this situation. Continuous cultivation also leads to desertification, particularly when livestock are allowed to graze on crop residues and no fallow period is possible. A 26-item (1968–79) bibliography in English and Spanish is appended.

SA/TOA 1-77 931111300

083 **PN-AAJ-201**

DRAFT ENVIRONMENTAL REPORT ON CAPE VERDE

University of Arizona, Office of Arid Lands Studies, Arid Lands Information Center.
1980, 57 p.

Sponsored by A.I.D. through the U.S. National Committee for Man and the Biosphere

The Cape Verde Islands currently suffer from soil degradation, improper land usage, and shortages of fuel and water. Such are the conclusions of this draft report which profiles the natural resources of these 10 islands and five inlets, and provides related geographical, climatic, land use, and population data. Cape Verde's steep watersheds, torrential rains, rapid water runoff, and strong winds cause extensive soil erosion. The inhabitants add to the problem by removing natural vegetation (often by the roots) for fuel, construction, agricultural extension, and intensive livestock feeding. Since 1976, construction to modify slopes and stream gradients has included earth or stone-walled terraces, contour ditches to slow water runoff, and check-dams for streams. Regeneration of rangelands requires protection from livestock and, to restore soil organic matter, the planting of windbreaks and "green-manure" crops. Proper land usage, increased food production, and the cessation of environmentally harmful forms of farming require crop diversification, wider area irrigation, fertilizer and pesticide usage, and better grain storage facilities. To minimize soil erosion and vegetation loss, the intensive cultivation of steep and arid areas must end — even if this requires relocating current residents. Fuelwood demand drains the land and vegetation considerably, while imported fuels are too costly for rural residents. To effectively end the fuel shortage, Cape Verde must develop alternative energy sources such as windpower, biogas, and solar and geothermal energy. The scarcity of water is due to erratic or nonexistent rainfall; terrain that is unsuitable for reservoirs and conducive to runoff; and groundwater sources that are hard to locate because of the islands' volcanic formations. Water supplies can be increased by better surface water storage, slowing water runoff, and by inducing artificial recharge and increasing drilling of groundwater sources. Also needed to end the shortage are greater water usage efficiency, especially in irrigation, and improved survey information for water source exploitation. Appended is an 81-item bibliography (1935–80) in French, English, German and Portuguese.

SA/TOA 1-77 931111300

084 **PN-AAJ-202**

DRAFT ENVIRONMENTAL REPORT ON MALI

University of Arizona, Office of Arid Lands Studies, Arid Lands Information Center.
1980, 70 p.

Sponsored by A.I.D. through the U.S. National Committee for Man and the Biosphere

In Mali, the adverse effects of the recent drought, amplified by the increase in both human and livestock populations, have set in motion a series of events that have resulted in the desertification of large land areas. Most of the nation's environmental problems are associated with this cycle of desertification. This draft report examines this situation by providing environmental profiles of Mali's water, soils, vegetation, wildlife, and mineral resources. These profiles are complemented by brief discussions on current government responses in these areas and by overviews of the nation's geographic, economic, and demographic characteristics. Mali's environmental problems are chiefly the following. (1) Present land use patterns, together with an increase in aridity, have caused extensive soil erosion. (2) Deforestation is becoming more widespread, primarily as a result of extensive firewood and charcoal production. Other factors, such as desertification and brushfires, have also contributed to loss of vegetation. Areas particularly affected are the Mopti and Gao regions. Even in the well-watered south, forests have been cleared to a distance of a 2-hour walk from any village of 1,500 inhabitants. (3) High livestock numbers and poor distribution of herds on pastoral lands have contributed to the degradation of grazing lands. (4) Malaria and onchocerciasis are major health problems, particularly in the Senegal River Basin. The increase in perennial irrigation due to water projects suggests that schistosomiasis may also become a problem. Mali has set out a strategy to control desertification in its recent 1974–78 development plan. Appendices are included which cite specific environmental legislation, organizations, and A.I.D. country projects. A 180-item bibliography (1960–77) in English and French is appended.

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085 **PN-AAJ-203**

DRAFT ENVIRONMENTAL REPORT ON NIGER

Speece, M.
University of Arizona, Office of Arid Lands Studies, Arid Lands Information Center.
1980, 159 p.

Sponsored by A.I.D. through the National Committee for Man and the Biosphere

Niger falls entirely within the arid and the semiarid zones of West Africa and many of its major environmental problems are related to this fact. Over half the country is uninhabitable, while only about 20% of Niger is suitable for sedentary agriculture. This draft report investigates this situation in light of the country's natural resources of minerals, water, soils, vegetation, and fauna. Also provided are five appendices which offer maps, statistical tables, and graphs regarding geography, demography, the economy, and water resources. Additional appendices include a list of former A.I.D. area projects and an outline of Niger's environmental agencies and standing enumerated legislation. Niger's major environmental problems are the following: (1) Droughts in the Sahel, such as those from 1967 to 1973, have typically lasted several years and have been responsible for losses in nomadic livestock, forcing herdsmen into southern migratory routes. In addition, agriculture, which employs 92% of the nation's labor force, suffered, placing Niger into the role of a food importer. (2) Devegetation is extensive. Agricultural clearing, burn techniques, overgrazing, and fuelwood needs have been the primary reasons for accelerating this process. (4) Soil erosion is a major problem. Sparse ground cover, a characteristic of the arid climate, leaves loose soil susceptible to intense rainstorms and wind. The degree of soil degradation is also highlighted by shortening of traditional fallow periods and the reduction of intercropping and crop rotation practices. (5) Although the country is well endowed with groundwater, surface water supplies have been limited. Public health standards are quite relaxed and many problems can be linked to hazardous water supplies. To alleviate shortages, more wells must be constructed, with care taken not to aggravate existing problems such as desertification. (6) Population must also be considered with growing concern, since increases will place pressure on the nation's resource base. A 200-item (1938–80) bibliography in English, German, and French is appended.

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086 **PN-AAJ-204**

DRAFT ENVIRONMENTAL REPORT ON SENEGAL

University of Arizona, Office of Arid Lands Studies, Arid Lands Information Center.
1980, 105 p.

Sponsored by A.I.D. through the U.S. National Committee for Man and the Biosphere

Senegal's slow response to rapid economic, social, and technological changes has led to several environmental problems. This draft report focuses on these issues while profiling the nation's natural resources of water, soils, vegetation, wildlife, minerals, and protected areas. The relationships of these resources to enterprises such as agriculture, fisheries, pastoralism, and fuelwood production are highlighted in terms of the country's geographical and social characteristics, economy, and political structure. The following environmental problems are evident: (1) A quarter of Senegal's territory is arid and 70% is semiarid. Desertification is widespread, particularly in the northern part of the Fleuve region, Senegal Oriental, the eastern central zone of Casamance, and the Cap Vert region. Uncontrolled grazing, inadequate control of forest exploitation for fuelwood and coal, accidental and agricultural brushfires, and the abandonment of farmland due to loss of soil fertility all contribute to this erosive process. (2) Inadequate management of water resources has caused fluctuations in the productivity of the agricultural, livestock and forestry sectors. In the next 40 years, 13 dams will be built, providing electrical power and aid to irrigation which should raise cereal production five-fold. Unfortunately, much of the country will not benefit from these efforts and will continue to suffer from limited water supplies. (3) Most water supplies are polluted. In 1975, only 37% of the population had access to a safe supply of potable water. Water-related diseases, including malaria, onchocerciasis (which prevents the establishment of permanent farming communities in the fertile river bottoms), and diseases related to fecal contamination are serious health threats. (4) Population concentrations in the relatively developed Cap Vert region have led to the loss of rural productivity on which the country's development depends. (5) Growing urbanization has accelerated air and water pollution. Appended are lists of domestic and foreign environmental organizations, current and proposed counter-desertification activities, and a 180-item bibliography (1953–79) in English and French.

SA/TOA 1-77 931111300

087 **PN-AAJ-205**

DRAFT ENVIRONMENTAL REPORT ON UPPER VOLTA

University of Arizona, Office of Arid Lands Studies, Arid Lands Information Center.
1980, 138 p.

Sponsored by A.I.D. through the U.S. National Committee for Man and the Biosphere

The environmental problems of Upper Volta center around the country's intensive land use practices in the semiarid savannah and a lack of native water resources. Expanding patterns of aridity are decreasing the capacity of the land for carrying both human and livestock populations. The recent drought exacerbated these trends, contributing to the pace of desertification. This draft report analyzes these factors with specific profiles concerning the nation's water, soil, flora, wildlife, mineral, and energy resources. Geographic, economic, and demographic information add dimension to this presentation. The following specific environmental issues currently face the government. (1) Approximately 95% of the indigenous labor force is involved in agriculture and therefore soil conditions are extremely important to their standards of living. Soil damage from overgrazing, drought, slash-and-burn agricultural practices, and forest degradation is a growing problem. Rangelands and farmlands are both seriously degraded. (2) Increased deforestation and desertification is a consequence of the harsh climate and the whole system of degrading land use practices that are followed in Upper Volta — particularly the overharvesting of trees for fuel. Ninety-four percent of the total energy consumption is from wood resources. (3) Inadequate and hazardous water supplies have resulted from irregular precipitation and limited groundwater sources. Only 25% of the population has

access to safe water supply. These conditions have promoted the spread of communicable diseases, especially onchocerciasis and malaria. Appendices include charts and maps representing climatic data, demographic and economic information, environmental legislation, governmental structure, environment-related agencies, dam sites, and A.I.D. area projects. A 200-item bibliography (1961–80) in English and French is appended.

SA/TOA 1-77 931111300

088 **PN-AAJ-206**

ENVIRONMENTAL PROFILE OF THE REPUBLIC OF ZAIRE, PHASE I

Library of Congress, Division of Science and Technology.
1980, 94 p.

Sponsored by A.I.D. through the U.S. National Committee for Man and the Biosphere

Because of its slow economic and population growth, Zaire's natural resource base is not under serious assault. With forested areas remaining largely intact, pressure on other renewable natural resources can be managed in the short term. Zaire thus has the advantage of anticipating rather than reacting to potential problems. Nevertheless, from a micro point of view, it is already experiencing significant environmental problems around the periphery of its urban centers. This draft report discusses both of these perspectives while profiling Zaire's water, soil, forestry, and wildlife resources. An overview of the nation's physical, demographic, economic, and social characteristics as well as national park and reserve data is also provided. Population density, which is low nationally, is high in such urban centers as Kinshasa. Inadequate local sanitation facilities and limited water supplies, compounded by the lack of a national sewerage system, have created hazardous health conditions in these centers, where an estimated 25% of Zaire's population resides. In 1974, only 25% of the city dwellers had access to piped water. Pollution created by mining industries located in Eastern and Southeastern Zaire has increased. Offshore oil exploration and production in Bas-Zaire is a potential environmental concern. The pollution of surface and groundwaters by industry, as witnessed at Lake Kivu, is also becoming widespread. Rural areas must obtain water supplies from unprotected natural water sources, which encourage the spread of insect- and rodent-borne diseases: The newly established Service de l'Environnement is working to control industrial pollution and improve basic sanitary conditions. Unfortunately, Zaire lacks a comprehensive legislative framework for pollution control and little information is available concerning the responsibilities of the nation's environmental organizations. Seven appendices which provide supporting data and a 55-item bibliography (1944–79) in English, German, and Franch are appended.

SA/TOA 1-77 931111300

089 **PN-AAJ-272**

DRAFT ENVIRONMENTAL REPORT ON GHANA

University of Arizona, Office of Arid Lands Studies, Arid Lands Information Center.
1980, 171 p.

Sponsored by A.I.D. through the U.S. National Committee for Man and the Biosphere

The Republic of Ghana lies on the Gulf of Guinea on the west coast of Africa, just north of the equator. Its major environmental problems include soil damage and loss, deforestation and desertification, inadequate and hazardous water supplies, and increasing industrial pollution. This report is a preliminary review of information available in the United States on Ghana's environment and natural resources. Ghana's soils are very weathered, sesquioxide-rich, humus-poor, and mainly kaolinitic. This fragile resource has been subjected to land use practices (such as slash and burn cultivation) which have stripped away much of its fertility and promoted deforestation and desertification. Nevertheless, agriculture is Ghana's most critical economic resource. Seasonal shortages of water, especially potable water, are chronic in most of Ghana. Precipitation is irregular and groundwater is relatively scarce. Unfortunately, pollution of water by industrial, commercial, domestic, and community wastes is common. Treatment of all unprotected or surface water is recommended. In recent years, the Government of Ghana has encouraged the development of irrigation projects, most of which involve small- or medium-sized dams and pumping schemes. Short- and long-term development plans call for a total of 436,000 hectares of irrigated lands. These projects should be assessed for their impact on the environment. In addition, existing dams and water conservation practices have spread onchocerciasis, schistosomiasis, and mosquito-borne diseases. Greater insecticide and herbicide use has been recommended in a number of government-sponsored research papers. However, some of the chemicals mentioned in these papers have not been assessed for their long-term environmental impact. Other problems include the depletion of the nation's native game species. While legislation exists to protect wild species, enforcement is poor. A listing of literature cited (1959–80, 73 entries) and a general bibliography (1915–80, 64 entries) are provided. Appendices provide information on Ghana's population, economics, climate, environmental legislation, government, environmental organizations, dams, and AID-sponsored projects.

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090 **PN-AAG-132**

PROCEEDINGS OF THE U.S. STRATEGY CONFERENCE ON TROPICAL DEFORESTATION, WASHINGTON, D.C., 1978

U.S. Department of State, A.I.D.
1978, 84 p.

Conference Convened Jointly by U.S. Department of State and A.I.D.

Deforestation threatens to destroy the irreplaceable forest resources in tropical lands by the year 2000, with devastating socioeconomic and environmental results. This report on the proceedings of a U.S. Strategy Conference on Tropical Deforestation, held November 1978 in Washington, D.C., offers options to avoid those results. Conference topics included: (1) the nature of the problem; (2) international institutions' responses to date; (3) the state-of-the-art in biological research, commercial forestry and agroforestry, energy alternatives, and revegetation; (4) opportunities for industrial, environmental, and scientific actions; and (5) deforestation in humid and semiarid regions. Several specific conclusions were drawn. Population expansion, the demand for wood, and limited development opportunities are the main causes of deforestation. In-country institutional management of forest resources, especially systematic monitoring, is inadequate. Major scientific and technological efforts are needed to halt these trends. More information on deforestation rates and impact, types of lost forestation, and reforestation methods must be gathered and cooperation of local citizens and their governments in forestation activities must be enlisted. Proposed responses are: (1) improve the survey, inventory, and classification activities of tropical land-use policies and develop alternative forestry uses; (2) make forestry a major priority of broad development strategies, routinely including forestry activities in rural development programs; (3) develop population and energy programs which reduce the impetus for deforestation; (4) improve local, regional, and global monitoring; (5) improve environmental education, especially training of forest managers; (6) improve (under the lead of the United States) coordination of international efforts and information exchange; (7) develop comprehensive tropical forestry guidelines for U.S. commercial and development institutions; (8) upgrade A.I.D.'s forestry capability and interagency cooperation and increase its emphasis on agroforestry; and (9) support continuing research efforts, especially into clearcutting in tropical forests. A list of conference participants is included.

091 **PN-AAG-859**

BIOLOGICAL AND SOCIOLOGICAL BASIS FOR A RATIONAL USE OF FOREST RESOURCES FOR ENERGY AND ORGANICS: PROCEEDINGS OF AN INTERNATIONAL WORKSHOP HELD AT MICHIGAN STATE UNIVERSITY, 1979

U.S. Forest Service, Southeastern Forest Experiment Station.
1979, 205 p.

The increasing use of wood for energy purposes has many socioeconomic and environmental implications and raises important technical questions on the use of trees for fuel. This document presents the proceedings of an international workshop, sponsored by the Man and the Biosphere Program (MAB) Committees of Canada, Mexico, and the United States. Conference papers include reports on the socioeconomic consequences of and constraints to the use of land and forests for energy and organics (i.e., organic acids, aromatics, drying oils, lubricants, synthetic fibers, cosmetics, dyes, animal feed, and solvents); the resulting energy input/output relations; and the environmental consequences of intensive forestry and the removal of whole trees from forests. Reports addressing wood use and availability in individual countries are also presented. One report notes, for example, that Great Britain's forest area of two million ha produces only 8% of the nation's wood — requiring the rest to be imported at a substantial cost to the economy and clearly illustrating the obstacles to Britain's use of its forests for energy and organics. Other reports concern Canada, the United States, Mexico, India, Indonesia, the Dominican Republic, and Latin America. Bibliographies follow most of the reports. Major workshop recommendations include: (1) Each nation should assess its biological potential for using wood materials for energy and develop effective ways to monitor changes in the biological productivity of forests, trees, and shrublands. (2) Institutional arrangements should be made for international exchanges of information and technology and for the use of forests, trees, and shrublands for energy. (3) MAB should encourage countries to establish pilot sites for studies, demonstrations, and small-scale forestry operations. (4) Increasing human demands on forests and shrublands should be given priority in assessing the use of wood for energy, monitoring changes in land productivity, and designing programs to transform these resources to other uses. A list of conference participants is appended.

092 **PN-AAH-450**

FUELWOOD AND OTHER RENEWABLE ENERGIES IN AFRICA: A BRIEF SUMMARY OF U.S.–SUPPORTED PROGRAMS

Ulinski, C.A.
1979, 48 p.

Prepared for the Workshop on Fuelwood and Other Renewable Fuels in Africa, held in Paris, 1979

In response to recent Congressional mandates, A.I.D. has developed projects in renewable and nonconventional energy technologies which are responsive to rural needs, environmentally sound, inexpensive, simple to use and maintain, and easily replicable. This paper provides brief descriptions (not analyses) of 28 A.I.D. energy projects (15 in forestry and fuelwood, 13 in other renewable energy technologies) in Africa. Current and proposed A.I.D. forestry activities are mainly concerned with planting and managing trees for fuelwood production. Other activities, broader in scope, include institution building, training, land use and natural resource planning, and resource conservation pilot projects in such areas as dune stabilization and planting live fences. In addition to four studies and surveys on firewood, reforestation, and community forestry, A.I.D. is also helping to establish regional remote sensing centers in East and West Africa to provide satellite imagery for use in natural resource planning and management. A.I.D.'s development of other renewable fuels (by integrating energy components into existing projects or by supporting new projects) emphasizes energy needs for basic life functions such as cooking, heating, and water supply — activities representing 80% of all the energy consumed in Africa. Current and proposed

projects in this area involve institution building, data collection, and research and development of small-scale renewable energy technologies such as wood burning stoves, solar stills, charcoal-making techniques, and biogas digestors. The Peace Corps (PC) forestry and renewable energy program is also described. These PC activities have generally been ad hoc, their effectiveness limited by a lack of technical and material support. However, PC has been strengthening its capacity to address problems of deforestation and petroleum shortages. A major forestry initiative is underway and a global renewable energy program has been launched focusing on surveys of village energy needs and resources in seven developing countries and on renewable energy projects. More detailed information on A.I.D. energy projects is provided in a series of annexes. A 44-item bibliography is included.

AID/afr/G-1576

093 **PN-AAH-451**

TRADITIONAL FUELS: PRESENT DATA, PAST EXPERIENCE AND POSSIBLE STRATEGIES

Knowland, B.; Ulinski, C.A.
1979, 88 p.

Although the traditional fuels of firewood, charcoal, dried dung, and crop residues comprise 90% of all fuels used in developing countries, development of these fuels has largely been neglected. To help devise strategies for future action, this report provides an overview of available literature on the use of firewood and other traditional fuels in developing countries. In many areas, the use of fuelwood is rapidly outstripping supply — most notably in Nepal, Haiti, and parts of the Sahel, India, and Indonesia. The use of dung and crop residues for fuel has caused serious ecological problems such as erosion and reduced soil fertility and water retention. Fuelwood depletion also has severe economic effects. Substantial time must be devoted to fuel gathering, reducing the time available for economically productive activities. Solutions to the crisis range from forestry and conservation interventions to the use of alternative fuels. Interest in agroforestry is growing. A number of fast-growing tree species (e.g., *Leucaena*) are already fairly well known and could be adapted in many areas. Fuels can also be obtained from dead tree wood. Obstacles to such solutions include problems of land distribution, property rights, and shortages of nursery stock, fertilizers, and irrigation water. Other alternatives are more efficient fuel use, e.g., in stoves (an area in which basic research is just beginning); improved charcoal production technologies; and development of renewable energy sources. The most promising of the latter is biogas, which permits the use of nontraditional fuels such as animal and human waste and provides high-quality fertilizer as a residue. Biogas promotion must be balanced, however, by the realization that if wealthy farmers begin using biogas, the poor who traditionally collect the farmers' cowdung may lose their only fuel source. It is recommended that A.I.D. make a long-term commitment to traditional fuels; integrate forestry components into rural development programs; and strengthen the flow of forestry information to USAID's. Other recommendations include expansion of Peace Corps village energy surveys. Appendices include a partially annotated 26-page bibliography (1978–80).

AID/otr-147-79-59

094 **PN-AAH-452**

AIDING THE ENVIRONMENT: A STUDY OF THE ENVIRONMENTAL POLICIES, PROCEDURES AND PERFORMANCE OF THE U.S. AGENCY FOR INTERNATIONAL DEVELOPMENT

Blake, R.O.; Lausche, B.J.; Scherr, S.J.; Stoel, T.B., Jr.; Thomas, G.A.
Natural Resources Defense Council, Inc.
1980, 272 p.

A.I.D. has made significant progress during the last five years in the environmental and natural resources area. This study, undertaken as part of a project to evaluate the environmental programs of international donor agencies, analyzes A.I.D.'s environmental policies, procedures, and practices and outlines a set of recommendations to strengthen A.I.D.'s program still further. Priority recommendations are made in three areas. (1) A.I.D. must improve its environmental assessments and complete such assessments by the end of 1980 for the 20 A.I.D. countries most environmentally threatened and for all A.I.D. countries by the end of 1981. (2) To upgrade its staff capability, A.I.D. should establish, within the Development Support Bureau (DSB), an Office of Environment and Natural Resources to consist of present DSB staff and a soil conservation specialist. A.I.D. should also add four full-time environmental officers in Washington and nine in the field. (3) A.I.D. should take steps to assure environmental soundness during project implementation, especially of environmentally sensitive projects such as dams, roads, irrigation, and new lands development. The manner of such supervision should be specified in all project documentation. Other major recommendations include preparation of a comprehensive environmental and resource policy paper and completion of programmatic assessments for malaria control, housing, small-scale irrigation, rural electrification, rural water supply, and small-scale industry. Also needed is research in support of sustainable development and resource management and intensified efforts in forestry, soil conservation, energy, and pest management. A.I.D.'s in-house training should be stepped up and environmental and resource seminars should be organized annually. A.I.D.'s existing computer systems should be used to establish a central record of environmental and natural resources projects and to provide summaries of project experience to A.I.D. and other development agency personnel. A.I.D. should also tighten procedures in selecting environmental contractors and urge other development organizations to commit themselves to environmental programs.

AID/DSAN-G-0027

095 **PN-AAH-464**

FUELWOOD AND ENERGY IN EASTERN AFRICA: AN ASSESSMENT OF THE ENVIRONMENTAL IMPACT OF ENERGY USERS

Clark University, Program for International Development, Eastern Africa Environmental Trends Project.
1978, 153 p.

The energy future of East Africa — Zambia, Kenya, Sudan, Tanzania, and Ethiopia — seems bleak. Although rapid increases in population and energy demands have led East Africa to consume energy at a faster rate than the developed world, the region has minimal exploitable energy resources. Increasingly costly fossil fuels must be imported. Given the region's depressed economic status, fuelwood (firewood and charcoal) is the only feasible energy source for its poor. Such is the main conclusion of this report on East Africa's current energy situation. Although firewood was a viable energy source until recently, continuous firewood collection has led to progressive deforestation and desertification. Furthermore, villagers must now travel increasing distances for firewood, thereby losing increasing amounts of productive time. Accordingly, small firewood collection and distribution enterprises have evolved. Also, as forests retreat from populated areas, the use of charcoal (which is easier to transport than firewood, but whose production consumes forests even more quickly than does firewood collection) is increasing. Several constraints to an effective reforestation/fuelwood program exist. The current artificial deflation in fuelwood prices (due to the availability of "free" firewood) discourages investments in reforestation/fuelwood enterprises. Developing a regenerating fuelwood forest demands a long-term commitment. Peasants, however, fear that with the present trend toward private land ownership, the land they hold by tenure may one day be purchased by others who will harvest the fruit of the peasants' work. It is difficult to convince them to cultivate future firewood resources when their fuelwood needs are immediate. This report recommends small community forestation projects as the most viable approach to solving fuelwood needs. Implementing such projects will demand long-term commitments by concerned institutions; enactment of laws ensuring community ownership of the lands cultivated; selection of suitable tree species; and inclusion of the communities in project planning — especially to educate community members in the methods and benefits of reforestation. Nine substantive appendices are included.

AID/afr-G-1356

096 **PN-AAH-466**

COMMUNITY PARTICIPATION IN AFRICAN FUELWOOD PRODUCTION, TRANSFORMATION, AND UTILIZATION

Hoskins, M.W.
1979, 75 p.

Prepared for the Workshop on Fuelwood and Other Renewable Fuels in Africa, held in Paris, 1979

The main source of fuel for cooking and heating in the vast majority of African homes is wood — the supply of which is rapidly dwindling. New approaches to local involvement in fuelwood production and use are often subsumed under the title, Forestry for Local Community Development (FLCD). FLCD initiatives employ a "bottom-up" rather than a "top-down" approach, involving local residents in management decisions on integrated land and resource use and showing communities how to share the benefits of fuelwood production. The FLCD approach raises several issues not considered important in industrial forestry. It calls for reorienting goals and expectations and redesigning training, equipment, and managerial supports. It also calls for donors, technical support agents, and local residents to recognize the need for integrated natural resources and energy planning at regional, national, and local levels. Not all FLCD projects have succeeded. Most projects which failed did so because of inadequacies in one or more of the following six elements: (1) identification of and criteria for participants; (2) clearly stated long- and short-range goals; (3) identification, adjudication, and dedication (for the duration of the project) of project lands; (4) start-up and maintenance planning with a schedule of inputs and with responsible parties identified; (5) distribution of benefits; and (6) an evaluation plan to support or, if need be, redirect the program. After wood is produced, it must be transformed to usable fuel as efficiently as possible, a process which includes harvesting, charcoal production, transporting, and drying and storing the fuelwood. To diminish waste, regional and national energy, fiscal, and transportation policies must be coordinated. The introduction of fuel-efficient stoves could have an immediate impact on available fuel. Models of such stoves developed to date have not been accepted by villagers due to failures to conduct experiments under real conditions before making attempts to place experimental models in use. To rectify this situation, local women should be hired as active members of the experimental team. A 49-item bibliography (1975–79), of which six entries are in French, is appended.

097 **PN-AAH-678**

WOMEN IN FORESTRY FOR LOCAL COMMUNITY DEVELOPMENT: A PROGRAMMING GUIDE

Hoskins, M.W.
1979, 64 p.

To deal effectively with local forestry problems in developing countries, it is necessary to focus on the group using forest products the most: the women whose principal chores are centered around wood. This report explores the problems and issues related to women's participation in forestry. In the past, traditional forestry efforts, i.e., those focusing on industrial plantations and parkland management, have failed. Enlisting community participation, especially from women, in forestry development seems to be the only viable means of implementing successful forestry programs. Studies show, however, that communities willingly participate only in those forestry projects that directly benefit their own needs. Constraints to community participation in forestry programs include:

(1) the difficulty of motivating communities to plant trees communally on scarce, overused farmland, without guarantee of direct economic benefit; (2) the lengthy timeframe between tree planting and harvesting; (3) the distance between the forestry project and the villages and the fact that the projects may benefit a distant area rather than the one in which the trees are planted; (4) the cultural belief that trees are "God-given" and not something one plants; and (5) the lack of forestry management skills. Women's roles in forestry development include the important tasks of gathering fuelwood and obtaining food and medicine from trees. Women are more likely to participate in projects that expand upon familiar activities, especially if women have direct control over, and benefit from, the project. Two models for forestry programming are proposed. The first model, the integrated approach, involves a project design directly suited to the needs of a particular community. The second model entails designing the forestry project first and then finding a community which could benefit from this type of project. Community responsibilities toward forestry projects include agreeing upon long- and short-range goals; plans for integrated resource use; a maintenance plan; projected benefits; and an evaluation plan. A 26-item bibliography in French and English (1975–79) and a suggested format for a project management plan are appended.

AID/otr-147-79-83

098 **PN-AAH-748**

THE WORLD'S TROPICAL FORESTS: A POLICY, STRATEGY, AND PROGRAM FOR THE UNITED STATES: REPORT TO THE PRESIDENT

U.S. Interagency Task Force on Tropical Forests.
1980, 53 p.

U.S. Department of State Publication No. 9117

President Carter's Environmental Message of August 2, 1979 prompted this U.S. Interagency Task Force report on the growing problem of deforestation in tropical lands. The report is in three parts. First, the world's forest resources are surveyed, together with the causes, rates, and consequences of deforestation. Next, national and international technological and institutional capabilities to meet the deforestation problem are outlined. Finally, the U.S. stake in tropical forests is analyzed and recommendations are made for a U.S. forest policy and a strategy to achieve it. The report confirms the widely held view that the world's tropical forests are in jeopardy and that serious social, economic, and environmental costs are being incurred, especially by the rural poor in developing tropical countries. The report also indicates that the United States has a vital stake in preserving both its own and other tropical forests and that, together with other nations and international organizations, it has the capability to help alleviate the deforestation problem. Several important perspectives emerged in the course of the study. (1) Wood harvesting for in-country uses and large-scale conversion of forest land to other, mainly agricultural, uses are by far the principal causes of tropical forest loss. (2) Although substantial in monetary value, U.S. imports of tropical hardwood account for an insignificant percentage of total hard and soft woods used in this country. (3) Legitimate reasons for tree removal and forest land conversion exist. What is needed is an expansion of the long- and short-term benefits of tropical forests through improved management. This includes their management as a renewable timber resource under the principle of sustained yield and the maintenance of other values (ecological, recreational, scientific, educational, etc.) that will be increasingly important in the future. (4) The future of tropical forests will be determined largely by decisions of governments on seemingly unrelated issues, e.g., food production, energy, and land use. Efforts must be made to address the effect of these decisions on tropical forests while also providing a new focus of policy for tropical forests.

099 **PN-AAH-919**

FORESTRY ACTIVITIES AND DEFORESTATION PROBLEMS IN DEVELOPING COUNTRIES

Zerbe, J.I.; Whitmore, J.L.; Wahlgren, H.W.; Laundrie, J.F.; Christophersen, K.A.
U.S. Forest Products Laboratory.
1980, 196 p.

To what extent have forestry activities alleviated deforestation problems in developing countries? To answer this question, an AID-sponsored 5-man team visited 17 developing countries, interviewed personnel from dozens of donor agencies, and reviewed forestry literature emanating from these countries and agencies. Their findings are presented in this overview report. An inventory of current forestry projects revealed a dominance of industrial efforts — that is, the establishment of capital-intensive pulpmill or sawmill complexes rather than the management of on-the-ground forestry stands. The second largest activity was reforestation/afforestation. Still fewer donors were involved in conservation activities. The authors conclude that forestry-related problems in developing countries are far worse than ongoing A.I.D. programs indicate. The authors note that forestry projects are often imposed on local residents totally from outside their communities and as a result fail to gain local cooperation. If these projects are to succeed, the local political structure must be involved and local political leaders made to feel that some of their needs are being met by that involvement. Overall, the authors recommend a balance between long-term environmental/forestry goals and immediate energy/food production needs. More coordination is needed among the various international donors and the developing country governments. A.I.D. and other international donors should cease their studies and take action. Sufficient knowledge already exists for sound programs. The authors point out that A.I.D. hiring practices are highly centralized and bureaucratic; more forestry personnel should be hired. In addition, Mission directors should be given authority to hire on the spot. A bibliography on forestry in the developing world (199 entries, 1947–80) is provided. Fifty-eight of the titles are in Spanish.

PA/AG/TAB-1080-10-78

100 **PN-AAH-942**

PROCEEDINGS OF THE USAID/ASIA BUREAU CONFERENCE ON ENERGY, FORESTRY, AND ENVIRONMENT, MANILA, 1979

A.I.D., Bureau for Asia, Office of Technical Resources.
1979, 309 p.

In response to increasing energy needs among Asian countries, a USAID Asia Bureau Conference was held in Manila, November 12–16, 1979, on energy problems and policies in Asia and their related forestry and environmental aspects. This report contains the proceedings of that Conference. The specific purpose of the Conference, which was attended by energy experts, host country specialists, A.I.D. and USAID officials, and donor agency representatives, was to make preliminary recommendations for A.I.D. assistance to Asian countries in ameliorating their energy problems. Conference presentations, to which brief bibliographies are attached, were of three types: papers presenting overviews of major issues, papers analyzing current energy planning, and A.I.D. country background papers. The role of energy in development was addressed from international, national, regional, functional, and sectoral perspectives. Workshop discussion groups examined the energy situation and program options in India, Nepal, Philippines, Thailand, Indonesia, Sri Lanka, and Bangladesh and the possible A.I.D. roles supporting energy interventions in these countries. Several conclusions were drawn: (1) Since many countries are experiencing a critical firewood crisis, A.I.D. should assist in augmenting fuelwood supplies and developing energy alternatives for rural areas. (2) A.I.D. needs to address the effects of the oil crisis in Asia by promoting conservation and developing renewable energy sources. (3) Energy strategies should be devised to meet the needs of both rural and urban sectors. (4) The energy implications of non-energy projects must be addressed more thoroughly in project development. (5) A central training course in energy issues must be established for A.I.D. Mission personnel and the inclusion of energy specialists on Mission staffs should be considered. (6) A.I.D. should increase collaborative energy assistance activities with other donors, particularly with the Government of Japan and the Asian Development Bank. (7) A problem-oriented regional conference such as the present one is an effective vehicle for developing sound A.I.D. energy policy. A list of conference participants is included.

101 **PN-AAH-980**

BOLIVIA: STATE OF THE ENVIRONMENT AND NATURAL RESOURCES — A FIELD STUDY

Freeman, P.H.; Cross, B.; Flannery, R.D.; Harcharik, D.A.; Hartshorn, G.S.; Simmonds, G.; Williams, J.D.
JRB Associates, Inc.
1980, 97 p.

Executive Summary Published Separately: PN-AAH-981, 13 p.

The gradual deterioration of the environment in many Third World countries is threatening to become a major constraint to development. This report, the first in a series of field studies commissioned by A.I.D. for its beneficiary countries, presents an environmental profile of Bolivia. An introduction defining the study's methods and scope is followed by illustrated chapters on wildland and wildlife, natural forests, plantation forests, soils and watersheds, the Altiplano range, and on the pollution and health impacts of environmental deterioration. Bolivia's renewable natural resources are affected by serious problems including soil erosion, range degradation, illegal settlement, hunting, logging, and deforestation. Health-related problems include pollution caused by pesticides and industry. These concerns are compounded by institutional weaknesses that inhibit corrective measures. Contributing further to the deteriorating environmental situation are the lack of pollution controls, regulations for the 1978 Health Code, and Government of Bolivia (GOB) emphasis on the eastern regions at the expense of the overpopulated Altiplano regions. Specific recommendations are presently aimed at improving natural resource management through training and educational activities and at reducing health hazards through pollution control and the development of improved sewage treatment technologies. On the institutional level, the development of comprehensive environmental planning is especially recommended, along with encouragement of environmental activities by non-government groups, developing appropriate conservation technologies, and integrating conservation activities with community development. Priority areas recommended for A.I.D. support (upon consultation with the GOB) include forestry; wildlands and wildlife; research with native forage species; community conservation efforts; development of the San Jacinto sub-watershed; pest management for cotton and horticultural crops; environmental education, especially regarding pesticide pollution; air and water quality standards; and coordination of environmental projects. An 81-item bibliography (1947–78) of English and Spanish sources is appended.

AID/SOD/PDC-C-0247 511000100

102 **PN-AAJ-019**

PRELIMINARY GUIDE TO AUDIOVISUAL MATERIALS ON ENVIRONMENTAL AND NATURAL RESOURCE ISSUES IN DEVELOPING COUNTRIES: A SURVEY FOR THE U.S. AGENCY FOR INTERNATIONAL DEVELOPMENT/MAN AND THE BIOSPHERE PROGRAM

Scherr, S.J.; Tanenbaum, S.; Maddamma, A.; Johnson, S.
Natural Resources Defense Council, Inc.
1980, 41 p.

In response to a 1977 Congressional Mandate, A.I.D. established its Man and the Biosphere Program to strengthen its technical and informational capability to address environmental and natural resources problems facing developing countries. In support of this objective, the International Project of the Natural Resources Defense Council conducted a preliminary survey to locate films, slides, and videotapes for use in training programs intended to increase the understanding of A.I.D. personnel and their host country counterparts on the importance of maintaining environmental quality and a sound resource base to sustain economic

development. Results of this survey are presented in this report. A total of 84 selected audiovisual materials are listed alphabetically by title and are identified by date, medium, length in minutes, color/black and white, language, distributor, producer, price, availability, and content description. They are also indexed by subject matter and geographic location. A selected list of the sources of the guide materials is included.

103 **PN-AAJ-021**

DIRECTORY OF SELECTED U.S. TRAINING PROGRAMS, SHORT COURSES AND WORKSHOPS IN ENVIRONMENTAL PROTECTION AND NATURAL RESOURCE MANAGEMENT: A SURVEY OF PROGRAMS FOR THE AGENCY OF INTERNATIONAL DEVELOPMENT AND THE UNITED STATES MAN AND THE BIOSPHERE PROGRAM

Taylor, J.G.
Sierra Club, International Earthcare Center.
1979, 181 p.

Recent U.S. Government mandates and a surge of worldwide concern for environmental and natural resource management have created a demand for training programs in these subjects. Several U.S. institutions now offer training programs in various aspects of environmental protection, including forestry; agriculture; biological sciences; sociology; environmental science and engineering; ecology; agronomy; natural resource planning; urban planning; and sanitary engineering, health, and facilities design. This directory provides a selected listing and brief description of courses in these subject areas offered by U.S. universities, government agencies and departments, and private associations. University entries are listed alphabetically by state and name of institution. Pertinent program information follows, including institution address; name of course, program, and college or school; name of dean; degree granted; brief description of program content; admission information; types of English-language training available; number of foreign students enrolled; and areas of concentration in which Man and the Biosphere projects are particularly concerned. The latter include tropical and temperate forests; grazing lands; arid zones; fresh waters, mountains, and islands; biosphere reserves; pesticides and fertilizers; engineering works; urban ecosystems; demographic change; perception of environmental quality; and pollution. U.S. Government and private association training programs are listed with a brief description, respectively, of course content and participants, and of workshop, conference, or meeting content. The directory concludes with tables in matrix form ranking the institutions and their programs by degree of difficulty from most difficult to noncompetitive. Production of this directory was assisted substantially by the U.S. National Committee of UNESCO's Man and the Biosphere Program, government agency training personnel, and use of computer data bases and several college and university catalogues. Its use is intended for A.I.D. Mission personnel, foreign nationals, and others concerned with balancing the conflicting needs of development and environmental preservation.

104 **PN-AAJ-273**

FIREWOOD CROPS: SHRUB AND TREE SPECIES FOR ENERGY PRODUCTION

National Research Council, Board on Science and Technology for International Development.
1980, 247 p.

Report of an Ad Hoc Panel of the Advisory Committee on Technology Innovation for the Commission on International Relations

Over 33% of the world's population depends on fuelwood for cooking and heating; this is especially true for the developing nations, where 86% of all wood consumption is for fuel purposes. As growing populations increase demands for fuelwood and deforestation becomes more acute and widespread, the severity of the wood scarcity problem is receiving increased attention. This report, written by a panel of 22 international experts, reviews firewood crop species as an aid to effective management of scarce wood resources. The authors briefly describe the ramifications of wood scarcity for agriculture, environment, and world hunger and discuss the potential for proper fuelwood management, including wood plantations and use of fuel-efficient stoves. Inadequate local and national support and other potential obstacles to tree-planting activities are also discussed. The text is primarily devoted to a discussion of 60 aggressive, fast-growing fuelwood species and their appropriateness for use in each of the following areas: humid tropics, tropical highlands, and arid/semiarid regions. For each species, information is given on the botanic and common names; description, distribution, and yield; potential for firewood or other uses; environmental requirements; planting and establishment; pests, diseases, and limitations; and related species. The description of *Leucaena leucocephala's* wide range of potential uses — as fuel and forage and in soil improvement/reforestation programs — is of particular interest. The authors' intention is to provide a reference source to enable development planners, faced with severe wood shortages, to choose that species of tree most likely to thrive and be of use in a particular regional setting. To this end, attached to the report are a master list of firewood species, including those described in the report; selected readings organized by species; names of research contacts, their specialties and addresses; and an index of plants mentioned in the text. Also appended are a chapter on efficient wood-burning devices; case studies on Ethiopia and South Korea; a glossary of technical terms; biographical notes on the authors; and a list of the report's contributors (divided by country).

AID/csd-2584

105 PN-AAG-685

REACHING THE RURAL POOR: INDIGENOUS HEALTH PRACTITIONERS ARE THERE ALREADY

Pillsbury, B.L.K.
A.I.D., Bureau for Program and Policy Coordination, Office of Evaluation.
1979, 63 p.

A.I.D. Program Evaluation Discussion Paper No. 1

Obstacles to improving the health and nutrition of the rural poor include not only a dearth of trained physicians and modern facilities, but also the economic, social, and cultural differences that often exist between the health professional and the rural patient. Because over 2.3 billion people worldwide continue to rely on traditional healers and midwives rather than utilize a system they neither understand nor trust, a sensible policy to improve rural health is to encourage and utilize the resources represented by indigenous health workers (IHW's). This paper examines the potential for incorporating IHW's into formal primary health care (PHC) systems to increase community acceptance and improve the utilization of PHC services. The author recommends a comprehensive evaluation of all past and present projects containing a traditional health component to assess the problems and benefits involved in working with IHW's. Several common objections to the use of IHW's and countervailing arguments are presented. The objections include the tendency to disparage low-cost PHC as "second-class medicine"; donor fears that indigenous PHC is dangerous or of inferior quality; and the hypothesis that traditional medicine competes with modern medicine for patients. Since IHW's provide excellent services in drug distribution, birth attendance, and care of the mentally ill, their services in these areas should be encouraged. Where formal collaboration with IHW's is not possible, emphasis should be placed on understanding and building upon the concepts which underlie traditional practices, thereby making modern innovations more acceptable. The author recommends that A.I.D. follow the World Health Organization's lead in adopting the following policy changes: (1) encourage and support programs which train and utilize IHW's; and (2) focus attention on traditional practices in training professional health workers and in PHC project designs. Specific program guidelines and recommended sector studies conclude the report. Annexes on information needs, a 1977 World Health Assembly resolution, recommendations of a congress sponsored by the Pan American Health Organization, and a 100-item bibliography (1962–79) are attached.

930008500

106 PN-AAH-850

THE POTABLE WATER PROJECT IN RURAL THAILAND

Dworkin, D.; Pillsbury, B.L.K.
U.S. Agency for International Development.
1980, 96 p.

A.I.D. Project Impact Evaluation Report No. 3

The greatest impact of the Potable Water Project in Thailand was not health-related, but occurred in the form of economic benefits such as increased gardening, livestock raising, and crafts production. This surprising conclusion is a primary finding of this evaluation report. After brief sections on health sector background and on project objectives and implementation, the effectiveness of the project is considered. Some 250 water systems were constructed under this project, with an additional 550 systems built later by the Thai government. An estimated 17% of the rural population is now served by piped potable water as compared to only 3% prior to the project. Most of these water systems are not only still operating, but also financially self-sufficient, with users paying full costs of maintenance and operation. With only a few exceptions, operators appear competent and motivated, and have received consistent supervision from the Rural Water Supply Section of the Thai Ministry of Public Health. The economic, social, environmental, and health impacts of the project are evaluated. Although lack of initial baseline and village-specific health data prohibit confirmation of claims that health has improved, the convenience of direct, reliable water delivery close to villagers' homes has resulted in considerable time savings and increased water use, both of which have contributed to the above mentioned economic benefits. At first, almost all socioeconomic groups benefited equally from public-tap access. But as revenues lagged, metered private connections had to be installed to finance systems' operations — effectively cutting off the poorer villagers from service. In conclusion, successful water systems were found to have resulted from initial community contribution of time, labor, and funds; training and subsequent support for local operators; and the evolution of viable rate structures for delivery of water to rural households. It is recommended that piped water projects be considered and planned not just for health gains, but for their economic benefits as well. Other recommendations, some generally applicable to A.I.D. projects, others specific to water projects, are included.

493018600

107 PN-AAH-878

ASSESSMENT OF THE PUBLIC HEALTH SECTOR IN HONDURAS, 1975–85

USAID/Honduras.
1980, 176 p.

The Honduran health sector is complex, ranging from a sophisticated teaching hospital in Tegucigalpa to health workers providing simple treatment in village homes. This health sector assessment concentrates on human resources, management, logistics, and financing in three priority areas — communicable disease control, environmental sanitation, and personal health care. Diarrhea is a principal cause of general morbidity and high infant mortality in this nation. Despite efforts to vaccinate against immunopreventable diseases, outbreaks continue. In 1979, a polio epidemic occurred, with 226 paralytic cases and nine reported deaths. In addition, almost 5,000 cases of measles and 5,252 cases of whooping cough were reported (with 280 and 184 deaths, respectively). Many elements in the Government's malaria

eradication effort were discarded due to political and program changes. As a result, a marked increase in reported cases occurred — 7,503 in 1974 and 34,606 in 1978. Other common health problems include tuberculosis, malnutrition, and pregnancy and birth complications. Since 1974, high priority has been placed on water and waste disposal and basic health care coverage for all people. However, a reorientation within the Ministry of Health (MOH) toward integrated, regional-level preventive health care did not eliminate a long-standing predisposition toward nationwide programs and hospital-based care. The sheer growth of the MOH in recent years has produced a critical need for reorganization. Its major weaknesses relate to weak lines of authority, poor communications, poor use of volunteer workers, inadequate financing, and the politics of hospital construction. Authors recommend the establishment of clear lines of responsibility, creation of position descriptions for all MOH personnel, and promulgation of policy guidelines. In addition, regular performance inspections of regional sanitation programs should be carried out; logistical support should be provided to community-level health workers on a priority basis; and continuing education should be provided to volunteer workers. Basic medical education should be oriented toward nonclinical public health services and preventive medicine.

522014800

108 **PN-AAH-964**

HEALTH SECTOR POLICY PAPER

A.I.D.: Bureau for Program and Policy Coordination, Office of Policy Development and Program Review; Bureau for Development Support, Office of Health.
1980, 64 p.

Developing nations suffer from a lack of basic health care services, limited access to safe water and sanitary human waste disposal facilities, widespread incidence of communicable diseases, and shortsighted planning of the projects designed to alleviate these and other problems. This paper describes A.I.D.'s program to address developing country health needs, a program based on the belief that health is basic to human well-being and essential for achieving development goals. A.I.D. will provide training, essential equipment and supplies, and planning and analysis for programs in the following four areas: (1) The delivery of primary health care (PHC) is A.I.D.'s main priority due to its potential for providing a cost-effective, ongoing impact upon health problems. PHC programs receiving highest priority are those emphasizing mother and child health, nutrition, and family planning services. A network delivery system, relying upon locally-based "outreach" workers, is favored. (2) A.I.D. will sponsor the construction or rehabilitation of appropriate water systems to ensure safe water and proper sanitation, thus minimizing the spread of water-related diseases. A.I.D. requires local participation, skilled project personnel on all levels, and eventual system self-sufficiency for all projects. (3) In the area of communicable disease control, A.I.D. favors including basic immunizations in PHC programs, although special control programs are also needed. In the latter respect, A.I.D. will continue its long-standing support of anti-malaria projects and research for the development of a cost-effective means of controlling schistosomiasis (snail fever) and onchocerciasis (river blindness). (4) Finally, A.I.D. encourages institutionalizing health planning at local and national levels and linking health planning efforts to the development of other sectors such as nutrition, education, population, and agriculture. To maximize resources, A.I.D. advocates health planning which focuses on training of country personnel in health program design and management; establishment of baseline health data systems; and collaborative special studies to identify the most promising health interventions.

109 **PN-AAJ-008**

SENEGAL: THE SINE SALOUM RURAL HEALTH CARE PROJECT

Weber, R.F.; Kerr, G.B.; Smith, H.B.; Seymour, J.M.
U.S. Agency for International Development.
1980, 91 p.

A.I.D. Project Impact Evaluation Report No. 9

Have A.I.D.'s health care projects helped alleviate malaria, infant diarrhea, and other health problems afflicting the people of Senegal? This evaluation of the Sine Saloum Rural Health Care Project to establish a network of village health huts to deliver basic health services provides a partial answer to this question. Despite difficulties from the start, several important achievements were realized. With the help of villagers, health huts were constructed and equipped in 200 target communities. Training materials and a records system were developed and a village health staff was trained in their use. Three conditions must be met, however, if the project is to succeed: the huts must earn enough to cover operating costs; government supervision and support must improve; and the medicine resupply system must function. Other problem areas include a high turnover of hut health workers; the close proximity of the huts to each other which forces some to close; and the high salaries paid to village health workers which drain the system's capital. Finally, the project's scale is too large and project management unsatisfactory. Although the huts have not operated long enough to make the project's impact clear, records show that visits to village health huts are often for the same treatment already obtained at larger, more distant health centers. However, the continuous closing of health huts because of poor project management may well negatively affect villagers' attitudes toward primary health care. Recommendations include: altering the health hut financial system to avoid collapse; closing health huts which overlap services; halting construction of additional health huts until the existing huts are improved; including a family planning component; obtaining firm assurances of budgetary support from the government; and strengthening A.I.D.'s project management team. Since this evaluation, several corrective measures have been made such as delaying project expansion; recruiting an experienced project manager; studying similar, more successful projects; and redesigning the project. A 24-item French and English bibliography (1968–80) and technical appendices are attached.

685021000

110 **PN-AAJ-207**

TUNISIA: CARE WATER PROJECTS

Bigelow, R.E.; Chiles, L.
U.S. Agency for International Development.
1980, 59 p.

A.I.D. Project Impact Evaluation Report No. 10

Some 100,000 Tunisians living in dispersed rural settlements are using wells and springs that have been improved with U.S. assistance. This report evaluates a series of projects conducted by Cooperative for American Relief Everywhere (CARE), with partial funding by A.I.D. and assistance from the Peace Corps, in which 600 existing Tunisian water sources were renovated. According to the report's project implementation section, the projects involved little local participation. To control water contamination, the springs and wells were enclosed with relatively low-cost technology requiring little maintenance. Four subsequent report sections describe the impact on availability and use of potable water, on health and quality of life, on beneficiary participation, and on local institutions. Based on Tunisian records and standards, about 75% of the project sites were not producing potable water. Only 50% of the project sites visited were fully operational and adequately protected from surface contamination. No relationship between the CARE water projects and a change in the incidence of water-related disease could be determined. A negative impact on health may have occurred where users discontinued their own disinfection practices thinking the water was safe when in fact it may have been contaminated because project-provided treatment had ceased. Although most local disinfection and health education teams established under these projects are still in existence, they have not generally been effective. Included among the lessons learned from the CARE projects are: (1) future AID-supported water projects should concentrate on increased water quantity, dependability, and accessibility; (2) project design should reflect demonstrated community need rather than prepackaged donor solutions; and (3) U.N. water quality standards will have to be scaled down if ambitious potable water goals are to be met during the Drinking Water Decade (1981-90). The authors recommend that A.I.D. work with the Tunisian government to agree on a long-term public health strategy, experiment with alternative potable water technologies, and evaluate projects in a collaborative fashion. Various project-specific appendices are included.

664028600; 664028800; 664029800; 664029900

111 **PN-AAH-149**

ORAL REHYDRATION THERAPY: AN ANNOTATED BIBLIOGRAPHY

Baumslag, N.; Davis, R.; Mason, L.G.; McQuestion, M.; Sabin, E.; Snyder, J.; Wiesenthal, A.
U.S. Office of International Health.
1980, 125 p.

Collaborative project by Pan American Health Organization, A.I.D., U.S. Center for Disease Control, U.S. Office of International Health

Oral rehydration therapy (ORT) is quickly becoming an inexpensive, easily administered, and universally available way of combating dehydration caused by diarrheal diseases. This annotated bibliography was compiled to assist in understanding ORT as a means to treat dehydration and is organized in five sections. The first section contains 17 references pertaining to the history of the development of solutions used for oral rehydration. Glucose and electrolyte solutions have been used over the past 30 years and studies showed that the coupled transport of glucose and sodium in the small intestine results in accelerated transport of electrolytes and water. Studies conducted on ORT and its relationships to cholera are also included. Contained in the next section are 28 references describing clinical trials yielding information on methods of ORT administration, the reduced need for intravenous therapy, and the limitations of ORT. Most of these references address the efficacy of ORT as a means of treating cholera and infant diarrhea. References on the composition of oral rehydration solutions, treated in the next 23-item section, investigate the use of a single sodium concentration for all diarrheal cases, the feasibility of using sucrose instead of glucose, and the determination of the optimal potassium concentration. The next section, containing 12 references, treats the impact of ORT on morbidity and mortality resulting from diarrheal diseases. Accurate impact measurement is confounded by multiple factors such as wide variations in environmental, socioeconomic, and cultural characteristics; unreliable epidemiological data; and differences in the levels of training of those administering ORT. The last 58 references examine issues concerning implementation of ORT such as the training needed for administration, where ORT should be administered, the method of distribution, the mode of preparation, and the assessment of fluid requirements. Appended are a sequential bibliography (1949–79) and author and country indices.

RS/HEW/OIH-01-77 931119800

112 **PN-AAH-928**

ORAL FLUID THERAPY IN DIARRHEA AND DEHYDRATION: CURRENT CONCEPTS AND PRACTICAL CONSIDERATIONS

Parker, R.L.
Johns Hopkins University, Department of International Health.
1980, 30 p.

Dehydration — the loss of water and electrolytes through diarrhea — can fuel a vicious cycle in a child in which malnutrition begets diarrhea and diarrhea causes further malnutrition, until the child ultimately dies. The recent widespread use of oral fluid therapy (OFT) has significantly reduced diarrhea mortality, showing it to be an effective cure of relatively lower cost and greater convenience than intravenous feeding therapy. This report outlines the major approaches to OFT, ways of implementing these approaches, and issues still unresolved. OFT does not prevent the incidence of diarrhea but does minimize its effects. It replaces the child's water and electrolytes, aiding and sustaining the child's recovery and inhibiting fluid loss at the onset of diarrhea. The ideal OFT solution consists of sodium, potassium, chloride, sodium bicarbonate, and glucose; although glucose or sucrose combined

with salt is an effective early diarrhea retardant. The report recommends the usage of a standard mixture of 90 millimoles of sodium per fluid liter; continual feeding despite diarrhea, except in cases of severe dehydration; preparation of the solution with boiled water when possible; the non-use of antibiotics due to their limited effect and potential hazard; and minimal reliance upon packets and kits, because of their expense and logistical problems. The OFT program should be a multitiered system relying on early home treatment of diarrhea with sugar/salt solutions; peripheral health workers to disseminate the solution and to train and monitor families in dosage preparation and administration; a peripheral rehydration center equipped to provide complete oral fluids and intravenous feeding treatments and to reinforce the health workers' training; and a referral center to handle the most serious cases and to oversee the program. Unresolved OFT issues include the ability of families to administer the solution correctly and sanitarily; the possible ineffectiveness of a solution composed solely of sugar and salt; and OFT's nonapplicability to patients who are vomiting, in severe shock, or have an enzyme deficiency preventing the consumption of sugar. A 44-item bibliography (1948–80) is appended.

AID/DSPE-C-0055 932063200

113 **PN-AAH-929**

SCHISTOSOMIASIS CONTROL IN THE DOMINICAN REPUBLIC: RECOMMENDATIONS FOR APPROPRIATE COURSE OF ACTION

Farwell, A.E.
1980, 44 p.

Prior to approving a request from the Government of the Dominican Republic (GODR) to USAID to provide assistance in a schistosomiasis control program, a team of scientists was called on to evaluate the present status of schistosomiasis and of ongoing eradication programs. This report presents the findings of an economic analyst contracted to work with this team, review their findings, and recommend an appropriate course of action to USAID. Current schistosomiasis programs of the Center for the Eradication of Bilharzia (CEB) rely on incorrect prevalence data, which fail to account adequately for the possible spread of schistosome parasites by migration from known areas of infection in eastern provinces. Moreover, these programs are oriented toward case treatment and haphazard extermination of the host snail *Biomphalaria glabrata*, rather than toward arresting further infection and mollusciciding at identified transmission points. Major reorientation of the present control effort is required if *Schistosoma mansoni* (bilharzia) is to be controlled adequately. To this end, the following resources can be exploited without substantial new or additional funding: academic community capability to undertake *S. mansoni* infection and malacological research; and village health services and education, potable water, and sanitary excreta disposal programs. Because the GODR is able to carry out the former, the author emphatically recommends that USAID assume responsibility for neither the execution nor the financing of the reoriented program. Rather, USAID should encourage program improvement by recommending to GODR an extensive survey to delineate the locations where *S. mansoni* infection is now found and to provide data on prevalence, intensity, and incidence of infection. Also recommended is a control program — such as that outlined by the scientific team — aimed at better detection and identification of transmission points; molluscicide *B. glabrata* at those points; and treatment of identified *S. mansoni* infection. USAID should also consider geographic realignment of existing AID-supported programs to permit their beneficial application to areas of *S. mansoni* infection. A 19-item bibliography (1973–80) is appended.

AID/lac-C-1401

114 **PN-AAJ-007**

WATER SUPPLY AND DIARRHEA: GUATEMALA REVISITED

Dworkin, D., Dworkin, J.
A.I.D., Bureau for Program and Policy Coordination, Office of Evaluation.
1980, 49 p.

A.I.D. Evaluation Special Study No. 2

Evidence indicates that improved water supplies in rural communities reduce the incidence of diarrhea. To demonstrate this phenomenon, two communities in Guatemala, Florida Aceituna and Guanagazapa, were selected for study due to their similar population, environment, and health characteristics. The former, which obtained water from shallow wells and rivers, served as a control to establish a norm for diarrheal incidence without project assistance. The latter was provided with a piped chlorinated supply system. Data from both communities were analyzed independently. Halfway through the project, a program to alter sanitary behavior and encourage latrine construction was instituted in Guanagazapa, allowing changes in diarrheal incidence to be ascribed either to water alone or to both water and the new program. The mean amount used per person over the project was 25 liters daily for each person in Florida Aceituna and 68.4 liters in Guanagazapa. Eighty percent washed their clothes and bathed at home in Guanagazapa compared to less than 1/3 who did laundry and 1/5 who bathed in the control village. Guanagazapa showed a significant improvement in sanitary awareness over the project period and 79 new latrines were installed. Latrines continued to be built at a rate of two per month following the project. Almost no construction occurred in the control village. Data suggest that water alone was a sufficient condition to reduce diarrheal rates. Diarrhea declined substantially among the 1–45 age group in Guanagazapa, with children 1–7 benefiting the most. The health program and the increased use of latrines did not appear to decrease diarrhea notably. Data also indicate that water quantity rather than quality was responsible for improved health — the amount of water used at home was three times greater in the experimental than in the control village. Water quality, however, while good at the tap, deteriorated in the transfer to domestic containers. Analyses determined that half of the samples from domestic containers had fecal coliform bacteria and three quarters had some coliform bacteria. Three appendices and a 17-item bibliography (1948–79) are appended.

115 PN-AAG-792

STUDY ON THE DEMAND AND MARKET DEVELOPMENT OF LOW COST NUTRITIOUS BREAD IN KOREA

Whang, I.C.; Jo, S.H.
Sogang University, Seoul, Korea, Research Institute for Economics and Business.
1978, 219 p.

In 1975, under USAID financial sponsorship, Sam Lip Foods Co., Ltd., one of Korea's largest bread manufacturers, began production of soy-fortified bread. This study analyzes and evaluates findings from a subsequent survey of consumer attitudes and sales in a test marketing of the product. Data sources included first-hand information from consumers (obtained through the mail and in interviews at retail stores and residences), secondary sources from food balance sheets, and sales data from the producer of the bread and a sample of its dealers. The test marketing of this high protein bread was a failure, with only a small proportion of consumers buying the bread repeatedly. The authors attribute the poor results of this test marketing to the following factors: (1) the poor quality of the bread in terms of taste and odor; (2) the existing preference of consumers for milk bread; (3) inadequate and ineffective use of promotional materials; (4) the high price of the bread due to rigid government price controls and the unavailability of good quality soy flour at reasonable prices; and (5) the lack of a strong marketing program. In addition, rice remains the preferred staple of the Korean diet — a factor which restricted the market for soy bread from the outset. Despite the poor response to soy bread, the authors stress the importance of developing soy protein-supplemented foods. The rising costs and limitations of supplying animal protein foods will make these products increasingly necessary. The authors recommend that the Sam Lip Co. consider developing new soy flour products such as pastries — products which are assumed to have a larger market than soy bread. If the price of soy flour can be reduced, the company should consider eliminating regular bread and producing only soy-fortified bread. Also, if the company resumes marketing of the bread in the near future, it should be distributed only in large city supermarkets where a reasonable level of sales can be maintained.

AID-489-2-75-T 931083100

116 PN-AAH-242

ANALYSIS OF NUTRITION-RELATED ACTIVITIES IN HONDURAS

Stanfield, D.; Eckroad, J.; Sahn, D.
Community Systems Foundation.
1979, 150 p.

Present estimates indicate that nearly 75% of Honduras' preschool population and nearly 50% of its school-age population suffer from some degree of malnutrition. In 1976, the Government of Honduras (GOH) established the Sistema de Analisis y Planifacion de la Alimentacion y Nutricion (SAPLAN) to plan and stimulate the implementation of nutrition programs. However, SAPLAN has encountered numerous problems. A major difficulty has been the inability of the Honduran and U.S. bureaucracies to operate smoothly and to reach agreement on administrative procedures satisfying the legal requirements of both governments. A second difficulty has been the slowness, cost, and limited impact of many of SAPLAN's projects. For example, some agricultural projects, while increasing food production, did not increase on-farm or local consumption of these foodstuffs. SAPLAN is operating in a country where the common mechanisms for linking it to the social groups most in need of assistance are weak and in a constant state of flux. Authors' recommendations include: (1) investigating the institutional capabilities of both SAPLAN and the participating international agencies, especially those involved in supplemental feeding; (2) scrutinizing agricultural sector policies to determine their nutritional impact; (3) examining the differential impact of macro-policies in terms of nutrition on various segments of the population; and (4) studying the Ministry of Health's extended health coverage program to determine its impact on the rural poor. To improve SAPLAN's internal operations, the authors suggest the establishment of a Commission of Ministers, composed of representatives from its six coordinating agencies. The creation of such a council could elicit the necessary commitment from the ministries to assure effective implementation of SAPLAN's projects. The authors recommend that USAID form a multisectoral nutrition team, drawing from its agricultural, education, health, and engineering sections; establish an internal planning group; and develop a simplified model of the development process in Honduras. Final sections of the report discuss supplementary feeding programs and the GOH's nutrition-related health sector programs.

AID/SOD/PDC-C-0082 522002300
Also available in Spanish: PN-AAH-243, 166 p.

117 PN-AAH-528

REPUBLIQUE UNIE DU CAMEROUN ENQUETE NATIONALE SUR LA NUTRITION: RAPPORT FINAL

University of California at Los Angeles, School of Public Health; Cameroon, Ministry of Economy and Planning.
1978, 381 p.

Cooperative effort of the Government of Cameroon, USAID/Cameroon, and the University of California at Los Angeles

The extent of malnutrition among mothers and children in Cameroon has prompted the Government of Cameroon to undertake a joint research study with the University of California, Los Angeles, School of Public Health to determine the causes and characteristics of this malnutrition. This report, written in French, presents the results of that study. The study is based on a control group of 506 children, 5-years old or under, of relatively high economic rank whose nutritional status can serve as a point of reference for Cameroon and an experimental group of 5,689 children (5–59 months), 3,350 mothers, and 3,383 households. After introductory sections on Cameroon's demography, economy, and health conditions, the study's goals and the methodology used in its compilation are explained. The physical and laboratory signs (i.e., hemo-

globin concentration) of malnutrition in children and mothers are discussed. In the ensuing analysis of research results, the age and sex distribution of the sampling group, the nutritional status of children, and the levels of malnutrition are examined. The mortality associated with anemia, edema, and measles, and the characteristics of the target households and each of its members are also discussed. A survey of the types of milk (i.e., breast or bottle) and food consumed by children is presented as the basis for forming national nutrition programs. The proportion of children and families consuming various food types and the portion of family food given to children are discussed. Connections are drawn between mothers afflicted with goiters and tests to detect the presence of a certain acid in mothers' saliva that is indicative of ingestion of undercooked food types. Conclusions of this study include: chronic malnutrition in young children reflects prolonged deficiencies in calories and proteins; and evidence of malnutrition based on physical traits is more difficult to define in mothers than in children because of the greater impact of environmental factors on the former. Extensive annexes, tables and diagrams, as well as a 64-item bibliography (1955–78) of French and English references are appended.

AID/ta-C-1240 931088500

Also available in English: PN-AAG-664, 403 p.

118 **PN-AAH-576**

TOPICAL INVESTIGATION AND ANALYSIS OF NUTRITIONAL SUPPLEMENTS IN FAMILY PLANNING PROGRAMS IN INDIA AND PAKISTAN

Rulison, M.E.
Research Triangle Institute.
1970, 73 p.

The theory that improving the nutritional status of mothers and infants lowers fertility rates has been divided into several hypotheses concerning the effects on fertility of nutrition interventions in family planning (FP) programs. This report uses a modified systems analysis approach to test these hypotheses in India and Pakistan in terms of such variables as numbers of births and deaths, nutritional levels, and numbers of FP acceptors. The nine hypotheses tested commonly assumed that improved infant and maternal nutrition increases infant survival and decreases the number of children desired; that providing food supplements at FP clinics increases the number of clients; and that decreased infant mortality resulting from improved maternal nutrition lengthens the birth interval, thus reducing birth rates. Test results were as follows: (1) declines in infant mortality precede declines in birth rates by as little as 10–20 years; (2) FP is used when desired family size is achieved and the survival of at least one male is assured (except if a woman experiences the death of her own child); (3) malnutrition affects up to 50% of the people, primarily infants and preschoolers; (4) high infant and child mortality is partially due to poor maternal and child nutrition; (5) malnutrition lowers fecundity by increasing fetal wastage and infant mortality; (6) nutrition interventions motivate persons to visit FP centers only when actual family size approaches desired family size; and (7) a decrease in mortality at ages 0–4 years does not significantly increase population growth for 20 years; after which the rapid population growth rate, due to high numbers of persons entering their reproductive years, is offset by a reduction in total fertility rates. Recommendations based on these results include combining nutrition interventions with sanitation and child health programs; establishing experimental nutrition interventions for children aged 4–18 months; and collecting baseline data on factors such as changes in death rates by age and cause and in fertility rates by age and child mortality experiences. A seminar on the most current findings is also recommended. A 75-item bibliography (1945–70) is appended.

AID/nesa-460

119 **PN-AAH-710**

PERSPECTIVES IN MATERNAL–INFANT NUTRITION

Baumslag, N.; Sabin, E.
U.S. Office of International Health.
1978, 26 p.

Malnutrition is a major contributor to high LDC infant mortality rates. This paper examines the special problem and nutritional needs of those most vulnerable to malnutrition — infants, children, and pregnant and lactating mothers — and recommends specific remedial practices and programs. Pregnant mothers are usually undernourished, one cause of their offspring's contraction of preventable diseases or deficiencies, such as anemia or cretinism. The incidence of "low birth weight" babies is due to maternal infections, anemia, and reduced food intake; such infants are quite susceptible to infection, congenital defects, and death. Malnourished mothers also produce 33–50% less milk than their nourished counterparts. More mothers are either reducing the period of infant breast-feeding or abandoning it entirely in favor of formula feeding. This shift to formula feeding is due to such factors as convenience, urbanization, the lack of encouragement by health professionals for breast-feeding, and the aggressive advertising and local sales campaigns conducted by the formula companies. Formula feeding often transmits fatal bacteria, such as those causing diarrhea, through the polluted water used in its mixture. Due to its high cost, mothers dilute the formula to obtain larger quantities, resulting in the child's undernourishment. On the other hand, breast-feeding leads to lower infant morbidity and mortality rates due to its sterility, nutrients, and high antibody count. Its other benefits are its comparative low cost, ideal use as a weaning supplement, and child spacing effect. This report recommends that health personnel strongly encourage the practice of breast-feeding to dispel misconceptions and to ensure better child nutrition. Calorie-protein studies should be instituted and followed by integrated health and nutrition interventions, especially in family planning and mother/child health programs. The mother should be the focus of these efforts as the most cost-effective and enduring means of ensuring the infant's health. Marketing practices and misleading information by formula companies should be minimized. A 28-item bibliography (1966–78) is appended.

RS/HEW/OIH-01-77 931119800

120 **PN-AAH-851**

MOROCCO: FOOD AID AND NUTRITION EDUCATION

Gilmore, J.W.; Adelman, C.C.; Mayer A.J.; Thorne, M.C.
U.S. Agency for International Development.
1980, 63 p.

A.I.D. Project Impact Evaluation Report No. 8

Although Morocco has a high per capita GNP relative to most developing countries, its income distribution pattern is skewed and the health and nutrition status of many is deficient. In this report, the impact of the introduction by Catholic Relief Services of nutrition education into 250 Moroccan social education centers (SEC's) which distribute PL 480, Title II food is described. To launch this education program, a nutrition institute was established at Marrakech to train a cadre of Moroccan women in basic nutrition and health. This cadre developed a curriculum of practical lessons in nutrition, sanitation, and the treatment of childhood diseases which were presented at monthly nutrition classes held at the SEC's. Class attendance was spurred on by the prospect of obtaining Title II food. There was a significant correlation noted between increased education and improved nutrition in the children taking part in the program. Moreover, mothers enrolled in the program demonstrated a greater knowlege of proper breastfeeding practices, appropriate pregnancy and nursing diets, treatment of infant diarrhea, diseases requiring vaccination, and animal and vegetable protein sources. Management of this program was exceptional, as indicated by prompt food deliveries, an excellent record-keeping system, uniform and accurate infant weighing procedures, weekly home follow-up visits for absent or sick mothers, and monthly visits from the provincial directrices. It was learned from the program that dependence on Title II foods inhibits the potential expansion of this program and endangers its continuation; Title II programs can be used to gather data for project design; and requiring all mothers to pay to participate in the food and nutrition education program kept the individual centers self-sustaining and created a sense of responsibility for the mothers. It is recommended that Title II organizations establish cooperative relationships with relevant ministries; that methods be devised to phase out the donated food component; and that attendance be increased without diminishing the education program's impact. A 29-item French and English bibliography (1972–80), footnotes, and various other appendices are included.

608012300; 608014100

Nine-year-old Maria-Luisa Cantero learns the dietary value of locally-grown fruits and vegetables.

121 PN-AAH-322

ON ALLOCATING RESOURCES FOR FERTILITY REDUCTION IN DEVELOPING COUNTRIES

Berelson, B.; Haveman, R.H.
The Population Council.
1979, 90 p.

Center for Policy Studies Working Paper No. 40

Population growth in LDC's has led to a yearly allocation of $200 million by donor agencies to programs designed to reduce fertility. In view of the expense, surprisingly little investigation of resource allocation efficiency has taken place. To determine a superior allocation method, the authors of this paper analyze responses from recognized population planning experts on the effectiveness of current donor-funded programs; they also identify the most efficient strategies of intervention by analyzing variations in fertility response according to changes in resource allocation. The paper presents a 108-cell matrix composed of 12 strategies of supply- and demand-oriented interventions; three social settings (SS's) delineated by favorable responses to fertility interventions; and three program implementation (PI) categories describing the strength or weakness of LDC government support. The effectiveness of each cell is rated and the results analyzed. The most effective strategies are judged to be supply-oriented, specifically, family planning progams augmented by abortion and/or an unspecified new method. In every case, the ratings were positively related to the average strength of the SS and PI variables — without favorable conditions even the most efficient strategy will be ineffective. Using these findings, the authors estimate how expenditures should be allocated among the 108 Strategy–SS–PI combinations for the most effective results in reducing fertility. According to the model, only 25 of the 108 cells would be reasonable investments, and the five most favorable combinations would receive 35% of the total available resources. If applied, these standards would lead to a great disparity in country allocation. Since program effects would be better guaranteed if supported by established systems, funding would tend to be 100 times greater in countries which have family planning programs than in those which do not. The result of the analysis, then, is that the most effective method tends to be the least feasible. Included in the report are appendices on the questionnaires used, supply and demand interventions, profiles of respondents, and procedures for specifying diminishing economic returns.

AID/pha-C-1199 932063200

122 PN-AAH-324

POPULATION: CURRENT STATUS AND POLICY OPTIONS

Berelson, B.; Mauldin, W.P.; Segal, S.J.
The Population Council.
1979, 75 p.

Center for Policy Studies Working Paper No. 44

In the past 15 years, the amounts of money, time, and personnel allocated by developed and developing nations alike toward the study and resolution of the problem of overpopulation have increased dramatically. In almost every instance these inputs have been directed toward research, training, and policy measures to reduce fertility. In this paper the authors review actions taken to date, then use their conclusions to make projections for future demographic trends and policy. They point out that fertility rates are declining in the developing world as a whole, particularly in the 13 most populous countries. In fact, 28 out of 91 developing nations with a population of 1,000,000 or over showed 10% or greater declines in fertility from 1969 to 1979. Marital patterns, social development, and family planning (FP) programs have all contributed to these declines. Most LDC's have also experienced a reduction in mortality rates, but this decline appears to be slowing, while average life expectancy is slowly increasing. LDC populations thus continue to grow at an average rate of about 2.2% per year. The authors conclude that financial, political, and social pressures to reduce population growth remain strong. After an analysis of the status of ongoing fertility-reducing programs and technologies, the authors turn to a discussion of what lies ahead in the demographic development field. Based on current trends, substantial demographic momentum will persist into the next century; by the year 2000 the world's population will increase by 40–60% over today's levels. The authors divide the larger developing countries into four categories on the basis of their likelihood to reach a crude birth rate of 20 (certain, probable, possible, and unlikely) by the year 2000. The authors conclude with an analysis of projected contraceptive technology and various policy options to improve both the supply (via more integrated FP services) and the demand (via increased education and information on FP) for fertility and mortality-reducing programs. Included are appendices on priority donor-recipient countries, changing population rates, and means of fertility regulation and contraception, as well as a 69-item (1962–79) reference list.

AID/pha-C-1199 932063200

123 PN-AAH-326

TECHNOLOGY AND THE SOCIAL REGULATION OF FERTILITY

McNicoll, G.
The Population Council.
1979, 26 p.

Center for Policy Studies Working Paper No. 46

The 25-year history of efforts by modern national governments to limit high fertility has concentrated solely on biological approaches such as legitimizing and increasing the use of contraceptives and introducing family planning programs. Fertility behavior, however, is at the core of society's economic, cultural, and institutional patterns; therefore, sole reliance on applied biomedical approaches is invariably insufficient. In this paper, the author examines the effects of contemporary patterns of technological and institutional change on fertility and on possibilities for its regulation. He examines the structure of fertility demand, i.e., the desire for a specific (usually rather high) number of children. The author points out that the distribution of fertility costs (loss of the mother's income, costs of raising children, etc.) cannot be sepa-

rated from the distribution of income and wealth in society; it is society's institutional arrangements that diffuse or concentrate the economic costs of children. Such institutional arrangements include the nuclear family, local communities, and economic classes. As the development effort proceeds, the costs of children are increasingly relegated from larger groupings to the family. Likewise, the power of institutional arrangements to regulate fertility decreases. In addition, nonmedical technologies (e.g., those of transportation, communication and production) continually impact on society's institutions and consequently on fertility behavior. It follows that successful resolution of the world's fertility-related problems will have to go beyond family planning programs and other biomedical techniques to respond to the reality of rapid technological and institutional change faced by developing nations. Footnotes supporting the author's study are appended.

AID/pha-C-1199 932063200

124 **PN-AAH-327**

FEMALE MIGRATION IN DEVELOPING COUNTRIES: A FRAMEWORK FOR ANALYSIS

Thadani, V.N.; Todaro, M.P.
The Population Council.
1979, 52 p.

Center for Policy Studies Working Paper No. 47

Potentially significant gender-related differences in the migratory process suggest the need for a specific analysis of female migration. The emergence of a new category of migrants — unattached women — reveals the inadequacy of existing research approaches which are based on the assumption that female migration reflects patterns of family or household migration. This report uses research conducted in Latin America, Africa, and India to develop a mathematical model of female migration patterns in LDC's. The authors show that where increased economic and/or educational opportunities for women are greater in urban than in rural areas, the increase in female migration rates from countryside to city is marked, and in many cases even greater than male migration levels. The authors argue that two additional variables, mobility marriage (marriage as a means to financial or social improvement) and marital/marriage migration (movement to join or to seek a mate) are particularly important as determinants of the individual woman's propensity to migrate. The authors then introduce a mathematical model to demonstrate that the proportion of women in a given society who choose to migrate is a function of: (1) the differential between expected urban income and average rural income; (2) the probability of marriage to males employed in the modern sector ("mobility marriage" factor); (3) the probability of marriage to any eligible male; (4) sex role constraints on spatial mobility for women; and (5) residual factors such as distance and extended family contacts. The net effect of including the two marriage-related variables in the equation is to find a mathematical basis for the increased female propensity to migrate which has been noted in a number of studies based strictly on economic models. The authors point out the value of their model in answering the critical need in developing nations for policy options to deal with migration and related development problems. However, more accurate measurements of the new parameters they introduce as determinants of female migration will be necessary in order to successfully use the model to estimate levels of migration. A 75-item reference list (1955–79) is appended.

AID/pha-C-1199 932063200

125 **PN-AAH-950**

RURAL DEVELOPMENT AND FERTILITY TRANSITION IN SOUTH ASIA: THE CASE FOR A BROAD-BASED STRATEGY

Lieberman, S.S.
The Population Council.
1980, 52 p.

Center for Policy Studies Working Paper No. 55

A point of contention for many population planning and development experts is the relationship, if any, between rural development programs and fertility — how can the two be integrated to simultaneously achieve gains in employment and output while reducing fertility? This paper addresses this issue by examining a broad-based strategy of agricultural development inspired by the Japanese experience and by discussing the applicability of that strategy to South Asia in general. Presented first are the major aspects of the broad-based strategy which integrates rural development and fertility reduction through a small farmer approach — the so-called "green revolution." The success of this approach in Japan is documented and a number of advantages to the small farmer strategy are listed. Of particular interest is the traditional view that fertility reduction is exclusively and specifically a function of the improved standard of living for small farmers which results from development actions. The author contradicts this view by providing evidence that fertility decline in Japan was caused, not by improved living conditions, but by changes in the productive contribution of children and in their perceived value as investments or security assets. He argues that it is only by introducing organized forms of security and support to replace the old age and disaster insurance roles of children that fertility will decline. He also discusses the limited applicability of the Japanese model in the South Asia situation because of differences in the political, economic, and agricultural structures between the two regions. Finally, two alternative broad-based strategies are presented; their major departure from the Japanese model is that a much more extensive scope of government involvement in development policy is envisioned. The two strategies, integrated rural development and guaranteed employment, are explained and their possibilities for the South Asia context are discussed. The report concludes with supporting footnotes and a 156-item reference list (1951–79).

AID/pha-C-1199 932063200

126 PN-AAH-954

CHANGING PATTERNS OF FERTILITY: THE IMPACT OF CONTRACEPTIVE TECHNOLOGY ON A MAYA VILLAGE

Elmendorf, M.
Research Institute for the Study of Man.
1980, 90 p.

Acceptance and implementation of strategies to limit family size have increased among the women of Chan Kom, a Mayan peasant village located in Yucatan. This report explores the factors supporting fertility control by analyzing the counseling and services of the family planning program and the age, health condition, and desired number of children of women who accept and use some form of birth control. Also assessed are socioeconomic variables such as the education level of women and children and income-generating work of women and men both in and outside the village. Charts of demographic and socioeconomic data further illustrate these findings. The determinants of fertility control were found to be highly complex, with acceptance of family planning methods cutting across age, economic, and educational lines. The marketing and production of sewn and embroidered crafts by women, as well as their participation in the work force outside of the home and village, were found to foster acceptance of family planning. Further, the development of new technologies for producing honey and raising cattle has increased women's contacts with outside businesses and fostered changes in family life. A surprising finding was that, having been introduced to sex education and family planning in grades five and six, unmarried children were encouraging their mothers to use contraceptives.On the basis of these findings, the author recommends the formation of discussion groups among community members on the new schoolbook materials and preparation of tape cassettes covering the latter materials for use in women's groups and/or the home. The importance of an appropriate time and method of presenting family planning information is also stressed. Appendices include an analysis of the rate of acceptance of contraceptive methods, a series of charts profiling the background of married women in Chan Kom, and a computer analysis of changing fertility patterns. A 58-item bibliography (1929–79) includes Spanish and English references.

AID/pha-G-1184 932061600

127 PN-AAJ-144

TURKISH FERTILITY SURVEY, 1978: A SUMMARY OF FINDINGS

International Statistical Institute.
1980, 21 p.

World Fertility Survey Country Report No. 28

From 1945 to 1975, Turkey's population grew at an annual rate of 2.5% until it numbered over 40 million people. Now, however, there are signs that the nation's fertility rate is beginning to decline. This report summarizes the results of the "Turkish Fertility Survey", which was based on interviews with a representative sample of 4,431 Turkish women. The survey revealed that Turkey has pronounced urban–rural, regional, and social differentials in practically every aspect of fertility investigated, indicating that the nation is in a demographic transition. This report details Turkey's trends toward later marriages, reduced cumulative childbearing, increased knowledge and use of contraceptives, and moderate family size preferences. The institution of marriage is widespread and strong: only 1% of women over 35 have never married and over 92% of the ever-married women are still in their first union. Although marriage usually begins at an early age, the change in the median age of marriage for older and younger women from 17.5 to 18.8 years reflects a moderate shift towards later marriages. This shift affects population growth through the reduced cumulative fertility of late-marrying women in comparison to early-marrying women of the same age, as evidenced by a substantial reduction in the total fertility rate from 6.33 to 4.33 live births between the latter two groups. When averaged over the past 9 years, this indicates a fertility reduction of 25% during the 1970's. The current norm of preferred small family sizes, an average of three children, is smaller than the achieved family sizes of older women. However, nearly half of the third and fourth births are unwanted, which may be connected to the reliance upon traditional birth control methods (e.g., withdrawal) instead of the modern methods (e.g., the pill). Knowledge of contraception is widespread and many women have tried modern methods, only to return to more traditional ones, possibly due to poor medical supervision or supply problems. That 55% of the women ever married have used contraceptives at least once attests to the concern Turkish families give to child spacing and limited family sizes.

AID/csd-3606 931054700

128 PN-AAJ-146

THE KENYA FERTILITY SURVEY, 1978: A SUMMARY OF FINDINGS

International Statistical Institute.
1980, 17 p.

World Fertility Survey Country Report No. 26

At its current annual population growth rate of 4%, Kenya's population of about 15.3 million people will double in 18 years. This International Statistical Institute (ISI) survey report assesses factors contributing to Kenya's growth rate: the strength of marriage, high fertility rates, preference for larger families, limited contraceptive usage, and the slight effect of noncontraceptive factors upon fertility. From 8/77 to 5/78, ISI interviewed 8,100 single and married women from 8,891 households. ISI's most important discovery was Kenya's extremely high fertility rate, an average of eight children per woman. Of these, an average of 6.3 survive — with only 2.5 children required for a balanced population level. Additional data suggest an increase in population fertility over the past 15 years. Responses to questions about preferred family size indicate that Kenya has a very pronatalist culture. Most women wanted large families and only a few, including those who already

had six children, wished to have no more. Although 88% of the women (in all categories) had heard of at least one contraceptive method, only 29% had tried one and only 11% had used a modern one. Of the 4,217 married women surveyed on current contraceptive usage, only 6% used modern methods. Breast-feeding, which reduces fertility by delaying menstruation, seems to be widely practiced. However, there is evidence of its decline among younger, educated, and urban women. Sexual abstinence due to recent childbirth or spouse separation seems to have little effect upon fertility. Only 16% of those ever married (defining marriage, as per the 1969 Kenya census, as a union sanctioned by religious or civil law including stable sexual relationships between partners living together) had their first marriage dissolved; 52% of these remarried. While data indicate the widespread practice of polygamy is declining, further study is needed in this area. The female age at first marriage is rising — 18.1 was the median age at marriage for those now 20–24 years old, as opposed to 17.1 for those now 30–34 years old. While the postponement of marriage lowers the fertility rate somewhat, more effective policies are needed to reduce the rate still further.

AID/csd-3606 931054700

129 PN-AAG-672

STUDY OF FAMILY PLANNING PROGRAM EFFECTIVENESS

Sinding, S.W.
A.I.D., Bureau for Program and Policy Coordination, Office of Evaluation.
1979, 28 p.

A.I.D. Program Evaluation Discussion Paper No. 5

It is generally accepted by population experts that a decline in fertility rates depends upon the interrelationship between the supply of family planning (FP) programs, determined by a government's political commitment and its administrative capability, and the demand for FP services, determined by the acceptability and adoption of the small family norm. This paper analyzes the results of a review of the literature on the relation of demand and supply determinants to FP effectiveness; it also develops guidelines to determine the conditions under which a major FP action is appropriate. The literature review found that FP programs do make a difference in the rate of fertility decline; progress in development alone is not enough. Key variables such as adult literacy, education, life expectancy, infant mortality, and GNP per capita combine to create the social context within which FP programs are implemented. The existence of favorable levels of achievement in these areas does not, however, necessarily guarantee the success of FP programs, just as their absence does not guarantee failure. For example, Indonesia and the Philippines have achieved high levels of contraceptive use despite development conditions that should preclude a demand for FP services, while Venezuela and Mexico have progressed rapidly on the development scale but are unable to achieve real decline in fertility levels. A set of theoretical guidelines to achieve rapid fertility decline are presented for further study. First, a country's social setting should be examined to determine the appropriate role for the public sector. If the setting is favorable, and fertility is declining even in the absence of a major public effort, the role of the state can be limited to ensuring the availability of FP services. If, on the other hand, decline in fertility is slow or nonexistent, the state needs to be more active. The paper's major conclusion is that political will and administrative capability alone cannot overcome basic sociocultural obstacles unless direct government action on reproductive behavior is an important feature of the program. Recommendations for specific countries conclude the paper.

930008500

More than 75 family planning clinics have been established in Nepal, whose population growth rate of 2.5% could result in 22 million inhabitants by the year 2000.

130 PN-AAH-321

THE FERTILITY IMPACT OF TRADITIONAL AND CHANGING CHILDSPACING PRACTICES IN TROPICAL AFRICA

Bongaarts, J.
The Population Council.
1979, 31 p.

Center for Policy Studies Working Paper No. 42

Modernization in traditional societies in tropical Africa is gradually breaking down the custom of postpartum abstinence during the lactation period, raising concerns that changes in these customs could lead to a substantial increase in fertility and birth rates. This paper presents a mathematical model to study the relationship between fertility levels and intermediate fertility variables such as the proportion of reproductive years spent in marriage and the frequency of use of natural or artificial contraceptive measures. This analytic framework is demonstrated by calculating and comparing the fertility rates of one African and two Western societies. Next the author discusses the role of variations in the duration of postpartum abstinence on fertility levels. The relationship between lengths of abstinence (3–30 months) and the proportionate female use of contraceptives on fertility is calculated, and the strong fertility-inhibiting effect of lactation is made evident. For example, according to the model, an 88% decrease in the length of the abstinence period doubles fertility, while a 50% increase in use of contraceptive measures reduces fertility by 50% for all durations of infecundability. The author's conclusion is that, contrary to accepted knowledge, modernization does not always decrease fertility; in fact, an increase in fertility is likely if contraceptive use does not increase rapidly enough to offset the effects of a decline in traditional abstinence and lactation periods. Two important policy implications are: (1) attempts should be made to discourage the abandonment of traditional child-spacing methods; and (2) use of contraceptive methods should be encouraged as an alternative means to achieving desired spacing between children. Further research into the prevalence of postpartum abstinence customs in Africa is encouraged. Appended is a 42-item reference list (1954–70) of documents supporting the author's positions.

AID/pha-C-1199 932063200

131 PN-AAH-325

RESEARCH IN POPULATION AND DEVELOPMENT: ISSUES AND COMMENT

Demeny, P.
The Population Council.
1979, 34 p.

Center for Policy Studies Working Paper No. 45

The diversity of issues in the field of population and development poses a problem for the researcher, who must decide where and how to allocate his efforts. Before embarking on any research effort, two specific questions should be answered: (1) Does the emphasis accorded by the investigator to various aspects of a chosen topic accurately reflect the relative importance of those aspects? (2) How should efforts be allocated within the field of economic demography as a whole? These questions underly three commentaries on methodological issues presented by the author at conferences of the International Union for the Scientific Study of Population and the Annual Meeting of the Population Association of America. The following issues are addressed: (1) demographic variables in development policies and plans; (2) disciplinary perspectives on economic demography; and (3) estimating fertility and mortality in developing countries. The author emphasizes the responsibility of each researcher to approach scientific problems with sensitivity to their social significance. The author also suggests that research in economic demography should proceed along two main lines. First, work should be organized around territorially defined populations and should attempt to draw a comprehensive view of past, current, and future trends. Second, policy issues should be defined politically rather than demographically. This would mean that traditional issues such as fertility, mortality, migration, and growth would be replaced by family policy, public health programs, rural development policy, and the like. In his final commentary, the author suggests that demographers not rely solely on statistics supplied by national governments in formulating policy recommendations. Rather, decentralized statistical information should be used since it corresponds more closely to the reality of how people live, work, and interact.

AID/pha-C-1199 932063200

132 PN-AAH-425

A.I.D.'S ROLE IN INDONESIAN FAMILY PLANNING: A CASE STUDY WITH GENERAL LESSONS FOR FOREIGN ASSISTANCE

Heiby, J.R.; Ness, G.D.; Pillsbury, B.L.K.
A.I.D., Bureau for Asia and Bureau for Program and Policy Coordination.
1979, 83 p.

A.I.D. Program Evaluation Report No. 2

The AID-financed family planning program in Indonesia is one of the world's most successful, prompting the question of how to replicate that success in other family planning assistance programs. This report uses data collected from field visits and interviews to evaluate A.I.D.'s assistance to the Indonesian program and identify the underlying reasons for its success. The report describes the program's service network, its consumers, demographic impact, and A.I.D. inputs. A sociocultural study of the country shows that high population growth, administrative support, and community acceptance are the three factors whose convergence most favored the project's success. The history and description of the program, particularly the types and extent of service, are given. A.I.D.'s support is described in terms of leadership, commodities, organization, resources, local-cost programming method, and interagency linkage. Major strengths of

the program are: (1) a high level of national political support; (2) strong Mission commitment to the goal of the project and to Indonesia's national family planning program; (3) provision of grant rather than loan assistance; (4) responsiveness of the local cost programming process to local needs; (5) effective decentralization; (6) strong support from the Mission director and a competent, tenured staff; (7) close collaboration between Mission staff and local counterparts; (8) rapid adaptation based on field experiments; (9) a management rather than demographic orientation to the data system; (10) effectiveness of participant training; (11) integration, emphasizing process over structure, of health and nutrition services into family planning (not the reverse); (12) use of non-material incentives for acceptors; and (13) abundance of oral contraceptive supplies. Future problems faced by the A.I.D. program are imminent staff turnover; failure to extend services to urban areas and the outer islands; management; data, and logistical problems of expanding services into health and nutrition; and relations with the reorganized country planning board.Four appendices tabulating data on the program and an organization chart of the Mission are included.

133 **PN-AAH-577**

TOPICAL INVESTIGATION AND ANALYSIS OF PROMOTING FAMILY PLANNING THROUGH HEALTH SERVICES

Kennedy, F.D.
Research Triangle Institute.
1970, 129 p.

What role can health services (HS) play in the Near East–South Asia regions to optimally fulfill family planning (FP) objectives? It is speculated that combining FP and general HS programs can have two principal advantages: making FP services more accessible and cost-effective can increase the number of FP recipients; and decreases in infant mortality can reduce desired and actual family size over the long run. This report presents the results of a study of 11 hypotheses on the use of HS as a tool for promoting FP after the hypotheses were tested in three different models: a health effects model describing the effects of improved health on fertility behavior; a delivery systems model determining the best allocation of FP funds among potential HS programs; and a decision model representing the optimal sequence of decisions to be made relative to the budget allocation among several programs. The hypotheses tested included: that there is an important relationship between increased HS expenditures and decreased mortality; that HS clients are effective contraceptors; that the anonymity provided by an HS program enhances the adoption of contraceptive techniques; and that favourable attitudes toward FP result from its inclusion in an HS program. The major test conclusion drawn was that the data for the health effects model were more complete and appropriate than for the second and third models, for which these data were inadequate to generate any absolute conclusions. Recommendations based on these conclusions are: to conduct a complete information search for the health effects model in those areas not previously examined; to develop the decision model (but not the delivery systems model) utilizing professional opinion to augment the available data; and to conduct a series of experiments using the decision model, data, and professional opinion to determine the sensitivity of this model to data variation and the optimal sequences of decisions for various environmental conditions. A 191-reference bibliography (1955–70), a 100-item list of footnotes, and a structural model and objective function are attached.

AID/nesa-460

134 **PN-AAJ-314**

THIRD EVALUATION OF THE THAILAND NATIONAL FAMILY PLANNING PROGRAM

American Public Health Association; A.I.D., Bureau for Asia.
1980, 116 p.

A.I.D. Program Evaluation Report No. 3

Since the development of the first family planning (FP) project implemented in Thailand in 1968, great progress has been made there in FP and the use of contraceptives. The findings from an evaluation of the current National Family Planning Program (NFPP) are presented in this report. The NFPP has had the following significant impact upon population growth: contraceptive use, especially of the pill, has increased substantially since the commencement of NFPP; fertility is decreasing faster in rural areas than in urban areas; the steady decline in the fertility rates since the mid-1960's has accelerated since NFPP began; and the population growth rate has decreased from 3.6% to 2.6% during 1960–75. Despite these achievements, Thailand still faces unmet FP needs in such subgroups as the hill tribes and Indo-Chinese refugees. Also included in this report are the findings from the NFPP statistics system and from operational research studies in FP conducted in Thailand; the current status of specific NFPP program components such as information dissemination and education, manpower training, and contraceptive services; and a list of sources of support for NFPP. For the success of this program to continue, increased support is required from the Royal Thai Government (RTG) and international donors. Other recommendations arising from this evaluation include: (1) giving priority to geographic regions and subpopulations where FP acceptance is low; (2) emphasizing improved management and supervision at the village level; (3) including information about FP in health education programs; (4) giving all health education personnel formal training in rural health and FP delivery; (5) evaluating the impact of NFPP on health status, particularly with respect to maternal and infant mortality; (6) continuing pilot projects to determine the use of nonphysician personnel in FP service delivery; and (7) continuing subsidy by RTG to health facilities for voluntary surgical sterilization. Consultation reports and technical appendices are attached

AID/pha-C-1100

135 PN-AAG-825

RODENTS IN TROPICAL RICE

Fall, M.W.
Denver Wildlife Research Center, International Programs Section.
1977, 44 p.

Rodent Research Center, Philippines, Technical Bulletin No. 36

Rodent damage to rice causes widespread waste, storage contamination, and small-farmer economic problems. This report provides agricultural technicians working in the tropics with a summary of information on rodent-associated rice problems and major rat control methods used in Southeast Asia — particularly the Philippines — where evaluation of these control methods has been centered in recent years. Initial sections sketch the characteristic traits and activities of rats, their population levels (which increase during floods) in rice fields, feeding patterns, and harborage; as well as the calculation of rat-infested damage and extent of economic loss it causes, farmer attitudes toward rat control, and the often politically motivated government programs of rat control. Damage during early crop stages is often undetected due to the virtual invisibility of the rats and green plant damage. Rats inconspicuously inhabit rice fields and eat the grain of seedlings. By the time grain heads develop and plant damage is visible, the crop has nearly matured, and it is too late to initiate effective rat control to save the crop. Since rat control methods are costly in materials and effort, many farmers do not implement them as a preventive measure. Physical, chemical, biological, and other control methods to reduce or prevent crop damage are also discussed. Physical methods involve direct killing or extrusion of rats by digging or flooding burrows, trapping, drives, frightening devices, barriers, and electrocution. Chemical approaches include acute and chronic toxicants, fumigants, chemosterilants, and repellents. Biological methods utilize predators, disease and parasites, genetic manipulation, habitat modification, and rat-resistant rice varieties. Other control methods include bounty systems and human consumption of rats. Choice of a method or combination of methods by farmers and extension workers should be based on cost, practicality, potential side effects, and cultural and political acceptability; but above all, on the degree of crop protection they afford. A 62-item bibliography (1942–76) and a six-page paper, "Rat Control in Rice Fields," are appended.

PA/ID/TAB-473-1-67

136 PN-AAH-435

EVALUATION OF LOW-COST EXTRUSION COOKER IN SRI LANKA: SPECIAL REPORT

Ackels, A.A.; Gaylord, R.E.; Kuphal, E.E.
Colorado State University, Department of Agricultural and Chemical Engineering.
1977, 130 p.

LEC Report No. 3

The low-cost extrusion cooker (LEC), a simple system used to convert indigenous grains into low-cost, nutritious foodstuffs, was developed to reduce dependence on food-for-peace programs as a means of solving LDC food supply problems. This paper evaluates the performance of a pilot LEC system in Sri Lanka, determines its suitability for use in other LDC's, and recommends changes and improvements. The investigating team spent 10 days onsite evaluating Sri Lanka's LEC system, which used the Brady Crop Cooker to cook soybeans for farm animal consumption. The evaluation focused on the raw materials used, grain cleaning and storage processes, operation and performance of the Brady Cooker, and support equipment performance. The system's major problems were found to be maintenance-oriented. Out of a total loss of 50 production days, 43 were the result of maintenance-related problems. The team noted improper usage of tools and parts, lack of spare parts, and machines operating with missing or damaged parts. After a detailed analysis of its observations, the team's conclusions are that the intermittent-duty LEC system, if adequately managed, operated, and maintained, is capable of producing a product of satisfactory quantity and quality. Solution of the parts supply problem alone would increase LEC productivity by 30%. Specific recommendations on how to "debug" the equipment and suggestions on needed improvements in sanitation and health measures are given. Final recommendations for the Sri Lanka LEC are: (1) to investigate, select, and install continuous-duty auxiliary equipment so that a system-wide 98%, 120-hour equipment reliability factor may be reached; and (2) to improve LEC maintenance so as to increase production to at least 70% of its maximum production capacity. Until this level of dependability is reached, widespread distribution of LEC's could be counterproductive. The authors also suggest that a U.S. university work to make the Brady Cooker suitable for continuous duty operation and develop the system's capacity to increase the food self-sufficiency of LDC's. The authors urge prompt initiation of a pilot plant LEC development program to increase world use of the system.

RS-01-74 GTS

137 PN-AAH-712

EFFECTIVENESS OF FOUR RODENTICIDES IN DEEPWATER RICE

Poche, R.M.; Mian, Y.; Haque, E.; Sultana, P.
U.S. Department of the Interior; Bangladesh Agricultural Research Institute.
1980, 24 p.

Technical Report No. 4

Over one-half of Bangladesh is flooded each year, causing villages to become small, separated islands infested by rodents driven from the flooded fields. The rodents are a terrible problem for the production of deepwater rice, a major crop in Bangladesh's delta regions, as they raid the crop for food and nest materials. This report was based on a study that identified the rodent species that damage deepwater rice and compared the efficacy of four rodenticides used for their control. The study was conducted in five villages typical of deepwater rice areas of Bangladesh. The major rodent problem species were the black rat (*Rattus rattus*),

lesser bandicoot rat (*Bandicota bengalensis*), and bandicoot rat (*Bandicota indica*). The rodenticides used in the study include 1% benzenesulfonic hydrazide (DRC-4575), 0.005% difenacoum (DF), 2% zinc phosphide (ZP), and 0.005% brodifacoum (BR). The rodenticides were baited in wooden boxes that were monitored weekly, and an average of 10 boxes were placed on each island. Baits were placed in separate dwellings (to be moved every 3 days) and along the islands' peripheries. Bait was dispensed at stations in amounts of 100 gm (DRC-4575 and DF) and 200 gm (ZP and BR). Dyes were added to the rodenticides to verify the cause of death. Within 2 weeks, islands treated with DRC-4575 and DF experienced a rodent population decline to near zero; islands using ZP and BR realized a slower population decline, due to their larger size and the limited number of baits. DRC-4575 reduced rodent population by 90.1%; DF by 94.1%; BR by 90%; and ZP by 87%. DRC-4575 was noted for its quick effect, which may inspire greater local support for pest control efforts, and its high toxicity to rodents while not harming birds. DF's further examination is recommended. BR is very effective against anticoagulant-resistant rats. Black rats shied from ZP, which has good potential but requires more research for good bait formulation before any large scale usage. ZP may be sufficient for field-oriented campaigns. However, the effective control of Bangladesh's field and storage pests, while concurrently addressing public health problems, requires a broad spectrum rodenticide compound.

PA/ID/BNG-0003-78

138 **PN-AAH-730**

KNAPSACK SPRAYERS

Fraser, F.; Burrill, L.C.
Oregon State University, International Plant Protection Center.
1979, 31 p.

Knapsack sprayers (KNSP's), which have long been standard equipment for applying pesticides in developing countries, are now being introduced into developed areas as a low-cost alternative to larger mechanical sprayers for general use on small farms, for spot treatment on larger farms, and for spraying areas inaccessible to larger equipment. This report assesses the factors to be considered in determining which sprayer is best suited for any particular task. These factors are the sprayer's size, availability, cost, and the user's personal preference. The authors begin by contrasting KNSP's with hand-held sprayers. The latter come in different sizes and shapes, but all employ internal or external compression pumps. The spray is discharged onto the target for a short time before the pressure drops, requiring the user to pump it up again. Hand-held sprayers are better suited for use in home gardens. The typical KNSP, on the other hand, requires continuous hand pumping, since it is not prepressurized. KNSP's handle more liquid with greater user comfort and freedom of movement than hand-held sprayers and are used for bigger jobs. They can differ widely, however, in ease of pumping. KNSP's have a carrying capacity of 8–20 liters and can be made of stainless or galvanized steel, brass, or plastic. KNSP's must be properly cleaned and their chemical–water mixtures agitated for effective usage. Spray nozzles regulate the flow of liquids, atomize them into droplets, disperse the droplets in specified patterns, and provide hydraulic momentum. Nozzles used for manual sprayers include the flat spray type to produce an elliptical pattern, the flood type for wider angle and lower pressure spraying, and the hollow cone for high pressure and insecticide usage. A table of various spray angles and distances is provided to evaluate the nozzle's theoretical coverage and its proper spacing. Booms are spray extenders that carry several nozzles to ensure thorough area coverage. The report describes the components of various boom types and the proper way to assemble them. Also listed are instructions for sprayer calibration and for proper pesticide storage, disposal, and application.

AID/ta-C-1295 931046300

139 **PN-AAH-823**

DIPHACINONE RESIDUE FROM WHOLE BODIES OF VAMPIRE BATS: A LABORATORY STUDY

Burns, R.J.; Bullard, R.W.
Denver Wildlife Research Center.
1979, 5 p.

Bulletin of the Pan American Health Organization, Vol. 13, No. 4, p. 365–369

Rabies transmitted by the bite of the vampire bat, *Desmodus rotundus*, destroy approximately 1 million head of livestock per year in the Americas. A recently developed vampire bat eradication method is to capture some vampire bats, paint their backs with a paste containing the anticoagulant diphacinone (2-diphenylacetyl-1,3-indandione), and release them to contaminate other bats that groom them in their roosts. Because this method has met with consistent success when utilized — a 90–95% reduction of bites on livestock — the method is being proposed for wide usage throughout the affected regions. The possible effects, however, on nontarget species by diphacinone residues remaining in the corpses of bats intoxicated by diphacinone have not been widely investigated. This article describes one such study. Ten male and 10 female vampire bats from a laboratory colony were placed in a plywood cage, and fed *ad libitum* on defibrinated cattle blood. At least three weeks later, four bats were removed from the cage, coated with 1.5 ml of a commercial vampiricide containing 15.0 mg of diphacinone per ml, and returned to the cage to mix with the 16 untreated bats. A total of 90.0 mg of the diphacinone was introduced into the colony, a level and treatment ratio suggested for field use. Gas chromatography testing for diphacinone residue was performed according to established procedures using whole bat corpses. Untreated bats from a control colony showed no diphacinone residues. Treated and exposed bats showed great variations both in residue levels and dates of death and 90% showed external signs of anticoagulant poisoning. However, the bats surviving longest were found to have lower residue levels. The total amount of diphacinone recovered from all the bats was 1.17% of the 90 mg originally introduced (about 0.053 mg per bat). This low recovery rate was presumably related to rapid metabolism of the chemical and loss of the chemical on the cage structure and suggests that the eradication method described

poses little danger to nontarget species. Because of possible roost contamination, however, this method should be applied only by adequately trained personnel. A 9-item reference list (1966–76) is provided.

PA/RA(ID)-01-67 RES

140 **PN-AAH-824**

ACUTE TOXICANT IDENTIFICATION IN WHOLE BODIES AND BAITS WITHOUT CHEMICAL ANALYSIS

Johns, B.E.; Thompson, R.D.
Denver Wildlife Research Center.
1979, 13 p.

American Society for Testing and Materials, Special Technical Publication 693, p. 80-91

The identification of toxicants in baits and in animals' digestive tracts is a valuable tool for detecting poisons hazardous when ingested by wildlife and domestic animals and for developing more effective rodenticides. The research results presented in this report contribute toward finding a rapid and inexpensive method for toxicant identification without using traditional chemical analyses. A system was tested whereby color-coded plastic particles suited for use in bait formulation and subsequent retrieval from digestive tracts, and comprised of layers of fluorescent and ferromagnetic material, were combined with toxicants such as zinc phosphide. Comparisons were drawn between control and experimental groups of selected animals to determine their willingness to ingest both nontoxic and toxic bait containing the particles. Tests were also conducted to demonstrate the intactness and location of the coded particles in the animals' digestive tracts after death and to determine a practical recovery method. Results of these tests showed that: (1) the presence of the particles on nontoxic and toxic bait did not deter the rats' consumption; (2) the particles remained intact in the digestive tracts; (3) their location in the digestive tract was consistent for each animal species tested; and (4) the most practical recovery method involved using an ultraviolet light to illumimate the particles suspended in a fecal solution and removing the particles with a rod magnet. The report concludes by noting that, while additional work is needed to determine the percent of marker to be used in baits, the identification system sketched above should be included in the manufacture of toxic baits, and if possible, a rapid code identification system should be established at poison control centers. Appended are summaries discussing the validity of these research results, the pro's and con's of standardizing these testing methods, the difficulties of accurately simulating natural environments and choosing test species which represent endangered animals, and a 13-reference bibliography (1946–76).

PA/RA(ID)-01-67 RES

141 **PN-AAH-746**

SOLAR ENERGY DOMESTIC POLICY REVIEW, INTERNATIONAL PANEL REVIEW OF EXISTING FEDERAL PROGRAMS

A.I.D., Bureau for Development Support, Office of Energy.
1978, 106 p.

Due to their increasing importance to U.S. foreign policy, international solar development activities have been funded at $25–30 million for FY 1978, 67% of which is for A.I.D. programs. This international panel report reviews recent international solar activities of U.S. agencies, especially those of A.I.D., the Department of Energy (DOE), Department of Commerce (DOC), and the International Energy Department Program (IEDP), as well as the major legislative authorities for them. A.I.D.'s integrated approach, which emphasizes cooperative programs with developing countries having decentralized renewable energy resources, focuses on solar technology development and demonstrations and requires that solar development depend ultimately on the countries themselves. DOE solar activities with other industrial countries have technically benefitted the U.S. domestic solar program. DOE, however, has not adequately stressed the expanded global use of solar technologies. DOE international cooperative solar R&D activities are not centrally administered; each project is managed by its related solar program office, limiting DOE's ability to implement overall strategies. The IEDP pilot program promotes developing country formulation of a comprehensive framework for national energy policy and strategy analysis. IEDP has drafted a country energy assessment for Egypt and has collected data for another in Peru. The assessments examine solar energy within the context of national energy resources and options. DOC's international promotion activities are effective but are based on a country's measurable potential for marketing existing technology and U.S. domestic goods. Although the current or potential effectiveness of these programs is difficult to assess due to their recent origin, rapid adoption of an overall solar development strategy as a component of U.S. international energy policy is recommended. The panel also notes the need for closer cooperation between U.S. agencies, especially in developing country energy assessments; additional resources for DOC and A.I.D.; and an examination of agency/solar activity roles. The report has extensive, detailed appendices, including a list of A.I.D. energy-related projects.

At the U.S. Department of Energy's Thermal Test Facility, solar energy technologies are developed for worldwide application.

142 **PN-AAH-940**

PROCEEDINGS OF THE INTERNATIONAL WORKSHOP ON ENERGY SURVEY METHODOLOGIES FOR DEVELOPING COUNTRIES, JEKYLL ISLAND, GEORGIA, 1980

National Research Council, Board on Science and Technology for International Development.
1980, 226 p.

The inadequacy of current information on escalating LDC energy consumption prompted the National Academy of Sciences to hold an international workshop in January 1980 to review existing surveys of energy consumption and potential demand in LDC's. Proceedings of that workshop are provided in this report. Working group reports on LDC energy needs in urban, rural, transportation, and industrial settings are presented, along with excerpts from 12 energy-related LDC studies and abstracts of 55 studies on energy assessments, energy survey design, and data analysis systems. Two preconditions for an energy survey that serves national and local planning needs were identified: (1) Institutions at both levels must have the capacity to accurately perceive energy problems and identify areas of most urgent concern. (2) The effectiveness of a survey depends on the existence of an institution that can use the results of the survey in policymaking. The workshop concluded that, generally, no survey methods are universally acceptable. Surveys should be designed for local situations and should be carried out in a flexible manner, using appropriate methods of analysis. Whenever possible, those cognizant of local energy issues and the survey's methodology should be employed and mechanical approaches avoided. Since energy decisions are usually a trade-off between energy and other elements, data on related sectors should be gathered, particularly in rural energy surveys. Secondary sources of energy information such as tax records and national census data should also be used. From the above, the following implications were drawn: (1) Survey priorities must be based on national needs determined by the country itself. (2) Technical advice at the design and analysis stages of a survey and financial support for practical training which can be implemented by local survey supervisors are both essential. (3) Centralized channels of exchanging information on data and survey methodologies are required at the international and especially the regional levels. (4) High priority should be given to information gathering and associated analysis. Bibliographies are appnded to the individual articles.

AID/DSAN-G-0190 936570300

143 **PN-AAG-670**

NEW DIRECTIONS RURAL ROADS

Tendler, J.
A.I.D., Bureau for Program and Policy Coordination, Office of Evaluation.
1979, 81 p.

A.I.D. Program Evaluation Discussion Paper No. 2

In order to increase the impact of road projects on the rural poor, emphasis has gradually shifted from paved highways to rural roads and from capital-intensive to labor-intensive construction methods. The author of this paper analyzes the benefits of the labor-intensive approach and the options A.I.D. can pursue to encourage its use. Various research findings on the cost-effectiveness and employment-generating potential of labor-based construction are reported. Several reasons are given for the continued preference of host countries and contractors for capital-intensive designs despite these findings. One simple reason is that both donors and developing country governments are more accustomed to working with equipment than with labor management. In fact, donor requirements for financing tend to encourage adoption of the capital-intensive mode. However, rural road construction, which is increasingly frequent, is more conducive to the labor-based mode than are highway or paved road projects. Since most central government highway departments lack the capabilities needed to manage labor-intensive rural road projects and have maintained a high priority on arterial road construction, A.I.D. should resist pressure to invest in the latter, investigate possibilities for complementary rural road construction, and remove management of such projects from national highway departments. Site selection criteria are discussed and recommendations are made to facilitate the adoption of labor-based construction. By refraining from subsidizing equipment costs and by seeking more acceptable environments, A.I.D. will lessen the relative costs of such techniques. It is emphasized that decentralized management can increase the political appeal of such projects and improve the chronic problem of maintenance, particularly use of the "no-maintenance model" (paving roads before the volume of traffic warrants the investment). Finally, to improve A.I.D.'s rural road policy, it is recommended that a country's road system be examined in its entirety rather than project by project and that community-based construction, including participation in road financing, be encouraged.A 94-item bibliography (1966–78) is attached.

930008500

144 **PN-AAH-750**

IMPACT OF RURAL ROADS IN LIBERIA

Cobb, R.; Hunt, R.; Vandervoort, C.; Bledsoe, C.; McClusky, R.
U.S. Agency for International Development.
1980, 49 p.

A.I.D. Project Impact Evaluation Report No. 6

Since the construction in Liberia of four all-weather rural roads, some villagers of the Lofa, Nimba, and Grand Jide counties enjoy increased accessibility to markets, schools, and health clinics. Because these projects have apparently succeeded in providing such services, other villagers are now clamoring for similar assistance. First, however, it is necessary to assess who the actual beneficiaries were and how they benefited. A five-person evaluation team found that substantial implementation and road design difficulties were encountered in construction of the four roads by local contractors under the supervision of the Ministry of Public Works; and that the roads were economically justified in terms of the volume of passenger and cargo traffic. It was also found that the roads have had a mixed impact. Improved transportation has bettered educational opportunities for children of tribal communities, stimulated the cultivation of the cash crops of coffee, cocoa, and rubber; and reduced not only produce loss due to spoilage but also cargo costs of agricultural products by 90% in more isolated areas. Perhaps the most serious, long-term impact which negates these short-term benefits is the change in the land tenure and use system. Land belonging to farmers' tribes has increased in market value due to its proximity to the new roads and hence is sought by wealthy Liberians. Their renewed interest in this land impinges upon the traditional land tenure system, forcing farmers to relocate to areas removed from the benefits the roads provide. The net effect is the loss of a fundamental component of economic security and social stability. If people are to take full advantage of the access the roads offer, questions of resource and benefit distribution need to be addressed. Other negative impacts were identified. Roads have induced expanded lumbering activity and altered cropping practices — both of which threaten the environment. Vehicle repair costs have risen sharply due to the damage vehicles suffer from poorly maintained roads. Appendices discuss the evaluation's methodology; project design, implementation, maintenance and feasibility issues; and the impact of Liberia's coup d'etat on rural development.

669011600

145 **PN-AAH-751**

EFFECTIVENESS AND IMPACT OF THE CARE/SIERRA LEONE RURAL PENETRATION ROADS PROJECTS

Anderson, G.W.
U.S. Agency for International Development.
1980, 111 p.

A.I.D. Project Impact Evaluation Report No. 7

After years of dependence on declining mineral exports, the Government of Sierra Leone (GOSL) recently shifted its focus to agricultural development. The feeder roads projects reviewed in this report were intended to complement that shift. Overall, the Cooperative for American Relief Everywhere (CARE), which is implementing these projects, has performed well, successfully coping with funding delays and other difficulties. CARE has also displayed considerable innovation in several instances — using Peace Corps and other volunteer engineers, involving local chiefs

and villagers in construction and maintenance, and helping the GOSL to improve its road selection process. Whether the Ministry of Works will provide continued maintenance is a major question. Project benefits have included more frequent visits by extension agents, increased stops by light vans providing local transportation, increased ownership of motorcycles and bicycles, and greater access to health care. Fertilizer use and marketing of greater varieties and quantities of crops are also more prevalent. According to some reports, commercial activity (new rural markets, bank lending, new rice mills) has been stimulated. On the negative side, indications are that CARE roads may have precipitated shorter fallow periods for upland rice cultivation, greater rice scarcity, and increased swamp rice cultivation. These factors suggest that food crops are being replaced with cash crops such as cocoa, coffee, and oil palm — and are thus associated with reduced soil fertility, erosion, deforestation, and increased exposure to waterborne diseases. During project implementation, there was a shift from labor-based to equipment-based road construction. Unfortunately, A.I.D. and CARE did little to document this shift. The author recommends that in future projects A.I.D.: (1) determine whether the agricultural development strategy supported by the road project will benefit the poor; (2) obtain a commitment from the host government regarding road maintenance; (3) carry out baseline and impact surveys of new and old roads; and (4) provide incentives to A.I.D. personnel to carry out impact evaluations. A more detailed version of this report is appended.

636010100; 636011100; 636012600

146 **PN-AAH-768**

COLOMBIA: SMALL FARMER MARKET ACCESS

van Raalte, G.R.; Singer, S.; Severn, B.; Colon, J.C.
U.S. Agency for International Development.
1979, 15 p.

A.I.D. Project Impact Evaluation Report No. 1

Can labor-intensive (pick and shovel) construction of market access roads in the mountainous regions of Colombia result in significant improvements in the welfare of local campesinos? This document assesses the impact of one such effort — A.I.D.'s Small Farmer Market Access Project. Some 900 km of all-weather, unpaved access roads were planned to link isolated mountain communities with the nearest market road in order to stimulate agricultural production and trade and to open these communities to agricultural extension, health, and educational services. Construction was directed by the host government agency Caminos Vecinales, but as most of the work was performed by the intended beneficiaries, 60–65% of road construction costs were paid as wages to local campesinos. Substantial underestimates of the cost of construction will cause the final total of 59 roads averaging 8 km in length to fall well short of the projected total. Impacts of road construction and road use are discussed in detail. Marginal farmers, the landless, and the unemployed provided the main labor source, using the income gained to make improvements on house and farm, for fertilizer and improved seed, and for purchase of consumer goods. The resulting switch from animal to motorized transportation sharply reduced transport costs, leading to increased agricultural production without changes in policy or agricultural extension services. Wages in the areas near the roads have also increased, as the landless now have alternative employment opportunities. The anticipated increase in government services such as health and education has yet to take place, however. The evaluators raised long-term questions concerning the inadequacy of maintenance funds, the need to guard against erosion and siltation of rivers, and the lack of political support for replication of the project. In conclusion, the project was found to offer a replicable model for labor-intensive construction of rural roads under specific conditions. Attached to the report are various annexes regarding evaluation methodology, development strategies, alternative construction methods,and environmental considerations.

514019400

147 **PN-AAH-970**

RURAL ROADS IN THAILAND

Moore, F.J.; Alton, C.T.; Lefferts, H.L.; Soonthornpasusch, S.; Suttor, R.E.
U.S. Agency for International Development.
1980, 51 p.

A.I.D. Project Impact Evaluation Report No. 13

Nearly 30 million people in the formerly isolated villages of North and Northeast Thailand have benefited from the 8,000 miles of roads built between 1964 and 1974 under the Accelerated Rural Development (ARD) Project. This report focuses on the impact of ARD on Thais who experienced for the first time a wide range of opportunities within and away from their home community. ARD's institutional objective was to increase the capability of provincial governments to respond to rural needs by delegating to local governors the responsibilities of planning, designing, building, and maintaining rural roads, water facilities, and other public works. Although the degree of decentralization sought by A.I.D. has not been sustained, the existing ARD system does encourage local initiative. The roads have generally impacted favorably on those in formerly isolated areas. Continued education beyond the primary grades has been introduced to rural people, along with educational programs in health care and nutrition; and there have been increases in job opportunities both within and away from villages and in access to food, agricultural credit, inputs, and technical assistance. The land under cultivation and the intensity of land use increased dramatically wherever roads provided access to markets. Availability of water and better transportation increased rice production and encouraged crop diversification, especially of corn, soybeans, and peanuts in the North and of cassava and kenaf in the Northeast. The most serious negative impact of the roads has been rapid deforestation and soil erosion due to increased demands, stemming from population and income growth, for food and agricultural products. Also, the social benefits of roads have been somewhat offset by a spread of

various epidemic and contagious diseases in areas from which it had previously disappeared. ARD has created a strong national institutional capacity to sustain the rural development effort, with most of the AID-funded equipment still in use in the project's original 31 provinces. Future ARD activities — which will focus on maintaining existing roads — will be constrained mainly by budget limitations. Appendices include a 17-item bibliography (1966–80).

493016300

148 **PN-AAH-971**

HONDURAS RURAL ROADS: OLD DIRECTIONS AND NEW

Hamilton, J.; Chapin, N.; DeMetre, M.; Fletcher, L.
U.S. Agency for International Development.
1981, 41 p.

A.I.D. Project Impact Evaluation Report No. 17

Honduras has the lowest ratio of roads to area and population in all of Central America. To assist Honduran road construction, A.I.D. developed two roads approaches differing in inputs and impacts. In 1965, A.I.D. approved a project to build feeder roads in areas isolated from marketplaces on the "trickle-down" theory that the roads would benefit rich and poor alike, lead to cash crop production, and reduce subsistence farming and cattle ranching. The project called for road construction with no complementary credit, extension, or marketing services. Case studies of two of the feeder roads showed that the roads stimulated the cultivation of additional land, the production of cash crops, and also improved local access to medical and educational services. Project benefits varied, however, depending on external factors. In one case, sugar cane production increased due to a sugar mill built after road completion, while in the other, an agrarian reform program initiated by the National Agrarian Institute promoted production of palm oil and citrus by small farmer cooperatives. In 1974, A.I.D. approved a project to assist agrarian reform by providing credit and technical assistance to model rural cooperatives and by constructing roads to connect cooperative fields to all-weather highways. Project delays prevented the planned use of local construction crews, education regarding the roads' benefits, and the establishment of an ongoing local road maintenance unit. These roads encouraged cash cropping, the availability of credit and extension services, and the cooperatives' development of schools. The evaluation team concluded the following: roads are needed for development, but do not guarantee it; corollary policies affect the roads' distribution of socioeconomic benefits; access roads are more consistent with A.I.D.'s new policy than are feeder roads, since the former allows specific selection of beneficiaries; and, a road's long-term impact makes it difficult to render a final project assessment. Appended are descriptions of evaluation methodology, a technical analysis of the roads, and an aerial study of the first project's impact in one area.

522010000; 522007000

To facilitate agricultural production and food transport in landlocked Lesotho, A.I.D. financed construction of a $31 million perimeter road.

149 PN-AAJ-135

SOCIO-ECONOMIC AND ENVIRONMENTAL IMPACTS OF LOW VOLUME RURAL ROADS

Devres, Inc.; A.I.D., Bureau for Program and Policy Coordination, Office of Evaluation.
1980, 173 p.

A.I.D. Program Evaluation Discussion Paper No. 7

The focus of current development investments in transportation has shifted from highways and railroads to low-volume rural roads, but few evaluations of the socioeconomic and environmental impacts of these roads have been conducted. This study reviews the available evaluative literature and presents issues to be considered in designing future rural road projects. Emphasis is placed on the broad social impact of rural roads and the diffusion of benefits to the rural poor. Impact areas in which roads are a significant factor are identified, e.g., agricultural production, employment, health, and education. Examples are offered of the potential benefits and problems of road construction in each impact category and questions are proposed for use in future evaluations. Roads must be location-specific in design if maximum benefits are to be derived, since roads are only one aspect of a region's development process. Roads almost invariably facilitate agricultural production and permit changes in crop composition (in response to increased market access), although it is usually the larger, wealthier farmers who benefit most. Roads also expand the use of technology by wealthier farmers, aggravating regional income disparities. Increased government extension services and cooperatives also tend to benefit the wealthier farmers. Increased availability of raw materials and markets encourages agribusiness and other commercial enterprises, but tends to discourage cottage industries. Road construction increases short- and long-term employment and land values and intensifies land use, while lower transport costs encourage a greater flow of consumer goods and travel. New roads also increase access to health, nutrition, and education services. Road development commonly causes local environmental problems such as deforestation, erosion, and decrease in soil fertility. The effects on national integration, community development, women, and minorities are too complex and regionally influenced to be generalized. Finally, criteria for designing projects in furtherance of social, environmental, and economic goals are suggested. Attached are a 170-item bibliography (1950–79) and lists of sources consulted.

930008500

150 PN-AAJ-199

JAMAICAN FEEDER ROADS: AN EVALUATION

Berg, R.J.; Gardner, C.; Horowitz, M.M.; Stearns, P.; Vandervoort, C.
U.S. Agency for International Development.
1980, 102 p.

A.I.D. Project Impact Evaluation Report No. 11

Although it upgraded a total of 181 miles of rural roads between 1972 and 1976, the Jamaican feeder roads project failed to have any demonstrably significant benefits. This report investigates the causes of that failure by examining the logic, appropriateness, and achievement of the project's goals. It was planned that road improvement would generate rural employment and help to stabilize the political climate. Furthermore, the roads were to facilitate market access, thereby stimulating increased agricultural production and income for small farmers. However, A.I.D. made a fundamentally illogical decision in relying on a feeder roads project as means to these goals. The projected labor-based construction mode was never actively pursued either by contractors or by the implementing agency and no significant employment was generated. Even had rural employment increased, the authors show that each step in the planned chain of events — decrease in migration and urban crime, increase in tourism, and political stabilization — was only loosely linked to the preceding condition, making their achievement highly unlikely. From the developmental perspective, the project neither lowered transport costs nor increased land under cultivation, once again because of a flawed program logic. The project also had limited (even adverse) social, environmental, and institutional effects. It demonstrated the inadvisability of relying on central departments to implement labor-based construction and the need to consider rural roads projects as a part of integrated rural development, not as isolated infrastructure. The authors conclude that the haste brought about by the project's high political priority ultimately caused its failure. A more methodical design and review process would have revealed the ineffectiveness of the rural roads approach and its propensity for failure. These conclusions are particularly important since politically-oriented foreign assistance from any source could encourage repetition of similar difficulties. Detailed project strategies and economic, social, environmental, institutional, and engineering analyses are attached.

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148	PN-AAH-971	7.28	1.08
149	PN-AAJ-135	23.79	2.16
150	PN-AAJ-199	13.26	2.16

(continued from inside front cover)
and energy, strategies for expanding the use of traditional fuels, and summaries of A.I.D.'s environmental policies and programs. Especially interesting is item number 104, which provides a detailed and practical overview of fast-growing shrub and trees species such as *Lucaena leucocephala* which are suitable for fuelwood plantations.

Environmental degradation is a reality and a growing threat, especially in developing countries, where diminishing natural resources are being consumed by increasing numbers of people. Development planners are thus confronted with an urgent challenge to find practical ways to reverse this downward spiral. It is the hope of the publishers of ARDA that the informational resources on the environment found in the pages of this and subsequent issues may assist planners to meet that challenge.

Abstracts describing the draft environmental reports and forestry studies are located under the following item numbers:

Country Specific Environmental Reports 064-089
Forest Resources Reports 062, 063, 090-104

PHOTO CREDITS: A.I.D. photos, pp. 24, 35, 55, 64, Inside Back Cover. **World Bank photos, p.** 21. **World Health Organization photos, p.** 51. **U.S. Department of Energy photos, p.** 61

DIRECT ORDERS TO:
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DIRECT QUESTIONS TO:
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Washington, D.C. 20523
United States of America

A.I.D. RESEARCH & DEVELOPMENT ABSTRACTS

UNITED STATES AGENCY
FOR INTERNATIONAL
DEVELOPMENT (A.I.D.)
Volume 9, Number 3, 1981
TN-AAA-033

Health and Nutrition

United States development assistance is applied in a world where:

- more than half a billion people—one out of every eight men, women and children—live under the crush of absolute poverty;
- average per person Third World income is $543 per year versus $8,070 in developed countries;
- fewer than 400 million children in developing nations attend school;
- roughly 20% of the world's population lack access to schools;
- more than 90% of all people lack clean water;
- only 16 million of the 80 million children born each year are immunized against preventable disease;
- 100 million children are always hungry and nearly 20% of all children die before the age of five;
- 500 million people suffer from malnourishment, which shortens their lives, stunts their growth, dulls their mental abilities, and leaves them susceptible to even more debilitating disease; and
- more than one billion people—25% of the world's entire population—receive no health care whatsoever, while another billion have only the most rudimentary and ineffective care.

These statistics mask misery of an appalling magnitude.

To the handful of people comprising the development assistance community, the repetition of these figures numbs with familiarity. To that larger composite of developed country people attempting to comprehend—perhaps for the first time—the poverty of existence experienced by so many, these statistics seem literally beyond belief. But numerous and expert sources testify that daily degradation is in fact the reality for just this enormous number of human beings.

The causes of such poverty and debilitation are inextricably intertwined. The interrelatedness of malnutrition, ill-health, infant mortality, unclean water, lack of education, overpopulation, and a host of other conditions is all too clear to development planners and practitioners. Despite the staggering complexity of these intertwined problems, integrated assistance strategies devised by A.I.D. and other development donors are helping to alleviate their individual and combined impact on the world's poor. As described in item numbers 091 and 092, A.I.D.'s low-cost health delivery system (LCHDS) projects integrate health services, family planning, and nutrition interventions using health auxiliaries to provide preventive and simple curative health care to primarily rural populations. Alone, a single intervention has little effect; combined with others in an integrated program, it leads to notable improvements. For example, since poor nutrition reduces the body's ability to defeat disease and disease changes the need for and the ability to use nutrients, it would be self-defeating to combat poor nutrition while ignoring debilitating disease.

With this in mind, integrated health service programs seek not only to increase available food but also to improve sanitation and education in personal hygiene and to reduce parasitic infestation and contagious diseases. Similarly, health and nutrition programs promote acceptance of family planning interventions, since parents are more likely to limit their families if they perceive that children will survive to adulthood. Between 1979 and 1981, A.I.D. applied nearly 50% of its health assistance funds in some 50 LCHDS projects with a total target population of roughly 50 million people. Item number 091 in this issue of ARDA contains summaries of 39 of A.I.D.'s LCHDS projects, while item 092 provides analyses of these projects.

Worldwide hunger is a central component of the overpopulation-malnutrition-poor health-poverty cycle. Hunger (chronic undernutrition) alone affects between 450 million and one billion people each year. But hunger has two often forgotten effects—a lowering of work capacity and an increased susceptibility to disease. For these and other reasons, the Report of The Presidential Commission on World Hunger (item number 115) admonishes the United States, as a nation with a "special capability and hence a special responsibility" to lead the campaign against hunger and to "make the elimination of hunger the cornerstone of our relationship with the developing world." The Commission's findings support the contention that the most basic human right is the right to food.

For its part, A.I.D. has developed a wide-ranging strategy operating in 40 developing nations and the United States, seeking new and creative ways to reduce worldwide hunger through cooperative programs in emergency food relief; increased food production; nutrition, agriculture, health, and family planning research and services; and application of available resources to meet basic human needs.

This issue of ARDA announces nutrition and food supply reports which describe protein-enriched foods for Paraguay (item 111), food fortification programs (112), school feeding programs in Kenya (113), Vitamin A research findings (114), and the implications of nutrition-fertility interactions for achieving low net reproduction rates (116). Reports related to technological change and food security (002), reducing post-harvest grain loss (003), food problems in Africa (008), fisheries development (016–019), food and crop research (033–041), and expanded agricultural purchasing power and enterprise development (069–076) indicate ways A.I.D eases hunger by strengthening food and agricultural economies. The health section of this issue contains additional reports on integrated health services while the science and technology section includes reports on solar and extrusion cookers, water pumps, and energy-related improvements in the food system.

The next issue of ARDA will include a review of issues in nutrition program evaluation and a description by A.I.D.'s Technical Program Committee for Agriculture, in response to the Report of the Presidential Commission on World Hunger, of the Agency's anti-hunger programs.

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SUBJECTS AND DOCUMENTS OF SPECIAL INTEREST

DOCUMENTS OF SPECIAL INTEREST IN THIS ISSUE OF ARDA: **Item No.**

A.I.D. Assistance to Education: A Retrospective Study 090
The A.I.D. Hand-Operated Water Pump: A Classic Example of Technology Transfer . 126
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- A.I.D. Project Impact Evaluation Report 059, 060, 083, 085, 086, 093
- A.I.D. Working Document Series, Colombia, General Working Document 043

Cornell University
- Center for International Studies, Rural Development Committee
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- International Development Series 072, 073, 082

University of Wisconsin, Regional Planning and Area Development Project
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Water Management Technical Report 007, 022-027

DOCUMENTS AVAILABLE IN SPANISH AND FRENCH: **Item No.**

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QUESTIONS AND ANSWERS ABOUT ARDA

What is ARDA?

ARDA, "A.I.D. Research and Development Abstracts", is a quarterly abstract journal issued by the Division of Documentation and Information, Office of Development Information and Utilization, Bureau for Science and Technology.

What is the goal of ARDA?

The goal of ARDA is to transfer development and technical information to active practitioners in development assistance.

For whom is ARDA published?

ARDA's target audience is A.I.D. staff worldwide and selected key institutions in developing countries. Such institutions are government agencies, universities, libraries, research organizations, and other public and private sector organizations.

What materials are abstracted in ARDA?

ARDA presents abstracts of AID-funded current and less recent research studies, state-of-the-art reports, sector analyses, special evaluations, and other documents which, taken together, describe a broad spectrum of international development experience.

To whom do I address additional questions regarding ARDA?

Please direct all correspondence and requests for further information to:

Editor of ARDA, S&T/DIU/DI
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Agency for International Development
Washington, D.C. 20523
U.S.A.

QUESTIONS ET RESPONSES RELATIVE A ARDA

Qu'est-ce qu'ARDA?

ARDA, "A.I.D. Research and Development Abstracts" (Résumés sur la recherche et la développement de l'Agence pour la Développement International), est une revue trimestrielle composée de résumés publiée par la Division de la Documentation et des Informations. Bureau des Informations sur le Développement et leur Utilisation, Bureau pour Science et Tećhnologie.

Quel est l'objectif d'ARDA?

ARDA cherche à transmettre les informations techniques et axées sur le développement, aux techniciens participant à l'assistance au développement.

A qui s'adresse ARDA?

ARDA s'adresse au personnel d'A.I.D. dans le monde entier et aux institutions clés choisies, situées dans les pays en développement. Des institutions de ce genre sont des organismes publics, des universités, des bibliothèques, des organisations de recherche, et autres organisations des secteurs public et privé.

Que contiennent les résumés d'ARDA?

ARDA présente des résumés d'études actuelles et moins recentes relatives à la recherche et financés par A.I.D., des rapports faisant le point des connaisances actuelles, des analyses sectorielles, des évaluations particulieres, et d'autres documents qui, ensemble, décrivent un large évantail de réalisation dans le domaine du développement international.

A qui dois-je adresser des questions supplémentaires au sujet d'ARDA?

Veuillez envoyer toute correspondance et demandes de plus amples renseignements à:

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PREGUNTAS Y REPUESTAS SOBRE ARDA

¿Qué es ARDA?

ARDA, "A.I.D. Research and Development Abstracts" (Sumarios de Investigación y Desarrollo de A.I.D.), es un periódico trimestral publicado por la División de Documentación y Información, la Oficina de Desarrollo Información, el Despacho de Ciencia y Tecnologia.

¿Cuál es el objectivo de ARDA?

El objectivo de ARDA es el de transmitir información técnica y de desarrollo a trabajadores activos en asistencia de desarrollo.

¿Para quién se publia ARDA?

La audiencia blanco de ARDA consta de los funcionarios de A.I.D. en el mundo entero y de los instituciones, claves seleccionadas en los países en desarrollo. Tales instituciones son agencias de gobierno, universidades, bibliotecas, organizaciones de investigación y otras organizaciones del sector público y privado.

¿Qué materiales son condensados en ARDA?

ARDA presenta extractes de estudios de investigación corrientes y menos recientes consolidados por A.I.D., informes del estado del arte, análisises del sector, evaluaciones especiales, y otros documentos que, juntos, describan un espectro ántlio de experiencia de desarrollo internacional.

¿A quién dirijo yo preguntas adicionales tocante a ARDA?

Sírvase dirigir toda correspondencia y pedidos de más información a:

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USER'S GUIDE TO ARDA CITATIONS

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This research report, summarizing official development assistance provided by A.I.D. to LDCs, was produced to meet the needs of participants in the United Nations Conference on Science and Technology for Development. It represents a synthesis of A.I.D.'s economic assistance philosophy, which is characterized by a two-fold thrust: (1) a "basic human needs" approach to bilateral development assistance, which combines the furthering of U.S. interests abroad with U.S. humanitarian interest in that quarter of the world's population condemned to live at a substandard level; and (2) a refocussing of A.I.D.'s assistance to LDCs from sophisticated technology to light capital, labor-intensive applications of scientific and technological developments. The report concentrates on development assistance in the fields of health, nutrition, and population; energy and natural resources, employment, trade and industrialization, and access to technology; food, climate, soil, and water; and urbanization, transportation, and communication. In each case, the relevant technologies and means of technology transfer are discussed in conjunction with a statement of the development problem addressed by these technologies and with illustrative examples of A.I.D. programs. The report concludes that comparatively little U.S. technology can be transferred to LDCs without significant adaptation. The LDCs have become aware of the need for technologies tailored to fit their resource endowments and absorptive capacities, and stress is being placed on the development of more appropriate technologies as well as on devising policies and institutions permitting LDCs to make better technological choices. An extensive subject index is included in this report.

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001 **PN-AAH-055**

A STUDY OF THE DEVELOPMENT OF THE UNIVERSITY CENTER FOR AGRICULTURE AT DSCHANG, CAMEROON: AGRICULTURAL MANPOWER NEEDS ASSESSMENT AND IMPLICATIONS FOR PARTICIPATORY DEVELOPMENT

Busch, L.; Dalrymple, W.; Zuidema, L.
Cornell University, Department of Agricultural Economics.
1979, 100 p.

The USAID Mission in Yaounde, Cameroon has offered to assist the Cameroon Government to develop its new University Center for Agriculture (UCA) at Dschang. To prepare for this assistance project, USAID conducted a brief study of Cameroon's agricultural manpower needs and of the potential impact of the Center on rural development in the country. The results of that study are presented in this report. Background information is provided on the government ministries, research institutes, educational institutions, and private organizations related to Cameroon's agricultural sector. Detailed information on the curriculum, staff, alumni, and current student body of the National School of Agriculture, the sector's current primary source of trained manpower, is also provided. An examination of factors likely to influence future manpower demands reveals that an increase in government intervention will require additional civil servants highly specialized in agricultural fields. Quantitative future employment needs for agricultural researchers and university faculty are included. A discussion of the planned development of the UCA proposes improvements in the Center's teaching, research, and extension activities. The authors discuss other factors likely to influence the success of the UCA's development efforts, such as government food price policies and several proposed integrated rural development projects supported by the World Bank. The study concludes with a list of recommendations concerning the location, size, curriculum, and staff of the new UCA. A list of persons contacted and documents consulted by the study team are appended.

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002 **PN-AAH-117**

LONG-TERM CONSEQUENCES OF TECHNOLOGICAL CHANGE ON FOOD SECURITY; THE CASE FOR CEREAL GRAIN

Barker, R.; Gabler, E.C.; Winkelmann, D.
Cornell University, Department of Agricultural Economics.
1979, 29 p.

Cornell International Agriculture Mimeograph No. 72

During November 1978, the International Maize and Wheat Improvement Center and the International Food Policy Research Institute sponsored the International Food Security Conference held in El Batan, Mexico. Presented at that conference, this paper examines whether the introduction of new crop technology results in greater stability or instability in cereal production—specifically, corn, wheat, and rice—over the long term. By way of introduction, current views on long-term world food grain production and demand trends are summarized. It is expected that increasingly intensive production strategies involving new technologies will be necessary to keep abreast with world population growth. The next four sections of the paper discuss those factors which influence stability/variability in crop yield, with emphasis on the role of technological change. The influence of yield-increasing technology on the stability of crop yield is a disputed matter, the conventional wisdom supposing an inverse relationship having been challenged in recent years. The potentially stabilizing and destabilizing characteristics of three specific technology components—water control, agronomic practices, and plant breeding—are singled out for evaluation in an attempt to resolve this debate. Trend line and lagged regression analyses are used in comparative case studies of different crop-producing areas around the world. The study concludes that technological change is not likely to cause a decline in crop-yield variability. Indeed, research results show a tendency for absolute variability to increase, even though the relative variability may remain constant or even decrease. While this should not serve as a deterrent to the use of modern inputs, it does suggest the need to increase investment in developing insect and disease resistant varieties if the inherent instability associated with new technology is to be minimized. Appended to the paper are the regression analysis results and a 20-item reference bibliography (1965–78).

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003 **PN-AAH-136**

PROCEEDINGS OF THE WORKSHOP ON GRAIN POST-HARVEST TECHNOLOGY, BANGKOK, THAILAND, 1978

Southeast Asia Cooperative Post-Harvest Research and Development Programme.
1978, 511 p.

Sponsored by the Thailand Department of Agriculture and the Southeast Asia Cooperative and Post-Harvest Research and Development Program

Many national and international organizations working in Southeast Asia consider grain post-harvesting technology to be critically important in reducing grain losses, producing more and better food for a growing population, and improving the standard of living for the millions of small farmers. This report presents twenty-two studies on the milling, drying, and storage of grain in various countries in Southeast Asia. The milling studies treat grain flow through an 800 kg/hour rice mill in Thailand, along with various methods of hulling such as rubber roll hullers and stone-disc hullers; the use of different Engelberg-type single pass rice mills at the village level in the Bicol

Region of the Philippines; and small rice milling units and an integrated rice processing complex in Thailand. In the drying studies, discussion is given to various kinds of dryers, such as aeration, simple corn-husk fueled mechanical dryers, and flatbed, solar, and farm dryers; pre-drying handling of high moisture paddy; farm-level rice post-production systems in the Bicol Region; effects of various grain handling methods on the drying process in a small flatbed dryer; a systems approach to selective mechanization on rice processing in Indonesia; and post-harvest rice technology activities of BULOG in Indonesia. The storage studies cover on-floor bulk drying and storage at a specially modified warehouse in Indonesia; corn storage; the effects of propionic acid on wet paddy; chemical screening studies on stored grain insects in the Philippines; effects of insect infestation on milled rice; high temperature/high humidity grain storage; village rice threshers; and post-production losses on a small farm in Sri Lanka. Abstracts and brief bibliographies accompany many of the studies. A list of workshop participants, the workshop's program and welcoming and keynote addresses, and minutes of various workshop discussions are included.

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004 **PN-AAH-569**

GOVERNMENT SPONSORED AGRICULTURAL INTENSIFICATION SCHEMES IN THE SAHEL: DEVELOPMENT FOR WHOM?

Waldstein, A.S.
1978, 115 p.

Prepared for USAID's "Papers on Sahelian Social Development" Series

The question, "Development for Whom?", is fundamental to the evaluation of development assistance programs. This paper specifically considers the extent of benefits accruing to the rural poor from large-scale agricultural/irrigation projects in the Sahel. The Senegal River Valley has been the locale of a series of such projects, including the Richard Toll Colony, the Gezira Scheme, and the Office du Niger. A common characteristic of these efforts has been the subjugation of the overall welfare of farmers to institutional or national interests, removal of farmers from their native lands, and/or reliance on migrant workers. In one instance, the Mossi (from Upper Volta) were conscripted to work on government farms in the interior delta. During the 1960's, the Mossi left the project in large numbers. Project management never understood the Mossi's ties to their homeland or their distress over the breakup of extended families and loss of secure positions in a stable society. Another drawback has been the exclusion of the farmers from all decisionmaking processes. In many instances the farmers were forced as tenants to cede their own individual economic interests to the interests of the overall project. In addition, few of these projects have offered the participants incomes substantially greater than otherwise current among farmers in the area. Perhaps the greatest irony is that the quality of diet for the participants has declined—all while providing burgeoning grain supplies to urban populations. Expulsion of cattle and a sharp reduction in fish production coupled with the increase in human population necessary for field labor are responsible for this decline. The author concludes that the majority of project troubles are related to social management factors; and recommends, among other changes, greater attention to and respect for social ties among the participating groups, representation of the villagers in decisionmaking processes, and increased emphasis upon labor-intensive cultivation.

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005 **PN-AAH-641**

A SOCIOTECHNICAL SURVEY OF GUAYULE RUBBER COMMERCIALIZATION; A STATE-OF-THE-ART REPORT

Foster, K.E.; Tayor, J.G.; Mills, J.L.
University of Arizona, Office of Arid Lands Studies; Midwest Research Institute.
1979, 432 p.

The U.S. rubber supply—both natural and synthetic—is precarious due to extensive worldwide demand, rising petroleum costs, and limited production of natural rubber. This preliminary state-of-the-art report assesses the potential commercialization of the U.S. desert shrub guayule as a domestic source of natural rubber and the agricultural and industrial aspects of guayule technology. With alternative rubber supplies (*Hevea brasiliensis* and petroleum) threatened by political and economic instability in Southeast Asia and the Middle East, guayule commercialization is being promoted as a natural rubber source in the U.S. Southwest, where up to 1–2 million acres of land may be devoted to guayule production by the end of the century. This report finds no insurmountable difficulties in growing guayule in the Southwest and Mexico, as guayule is highly suited to mechanized agriculture, makes good use of arid lands, does not require much water, is a prolific seed bearer, and will produce wood fiber, resins, and leaves as economical byproducts. New kinds of elastomers (plastics, silicones, leather goods) and reclaimed rubber are possible competitors to natural or synthetic rubber, but neither currently offers any comparative physical or economic advantages. The first part of this study provides an indepth review of current guayule technology including: (1) regional climatic and agricultural conditions; (2) plant modification and manipulation, i.e., plant breeding and genetic configuration; (3) methods for plant propagation, i.e., nursery and greenhouse techniques; (4) alternative agronomic practices for use in arid regions; (5) harvesting techniques specific to guayule; (6) alternatives for processing, handling, and storage; (7) rubber quality, chemical

structure, processing characteristics, performance, research needs and use; (8) conceivable byproducts and byproduct use; (9) and projected production yields. Also reviewed are the economic, institutional, and environmental prospects for guayule commercialization. A 230-item list of references (1941–79), agricultural statistics, and a list of team members and consultants are included, along with numerous tables.

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006 PN-AAH-760

AGRICULTURE SECTOR ASSESSMENT: JORDAN

Jordan University, Faculty of Agriculture; A.I.D., Bureau for Near East, USAID/Jordan.
1980, 65 p.

In order to plan for future agriculture programs in Jordan, USAID commissioned the University of Jordan (UOJ) to review the country's agriculture sector. This report presents the results of that review, along with USAID's perception of opportunities and constraints on future strategies for agricultural change. In Part I of the report, data on crop and livestock production and on labor and import levels in the country are presented. Differences in upland and valley topographies and agricultures, especially those of land under cultivation, along with rainfall, crop distribution, land holdings, and livestock are discussed; and upland watershed development and protection and the valley's irrigation needs are analyzed. Part I also describes changes in valley agriculture (such as increased reliance on plastic tunnels and mulch), current institutional support systems, and the manpower development activities of the UOJ and the Ministry of Education. Part II states USAID's conclusions and recommendations. Because Jordan's rapid economic and employment changes make its situation so unique, no clear indications of an overall agriculture sector strategy exist. USAID will focus on helping to reduce the country's dependence on foreign subsidies by increasing production of high value crops for export; a secondary goal will be to lower food prices for the poor, most of whom are urban. At Jordan's request, USAID efforts will be concentrated in the Jordan Valley, which has the greatest potential for increased yield and incomes, and where the availability of capital, high farmer motivation, and attractive market prices favor sector development. USAID will emphasize the removal of sector constraints by encouraging the adoption of higher productivity technology, more efficient use of current technology, improvement of technology and information transfer to farmers, and strengthening of agricultural services, especially through support of valley organizations. A review of watershed protection and development activities to determine the potential for increased irrigation will be encouraged.

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007 PN-AAJ-013

CONSTRAINTS ON SMALL FARMERS IN THE PRECISION LAND LEVELING PROGRAM IN THE PAKISTANI PUNJAB

Renfro, R.Z.H.; Niazi, M.I.A.; Ghaffar, A.
Colorado State University, Engineering Research Center.
1979, 128 p.

Water Management Technical Report No. 54

A Precision Land Leveling Program (PLLP) undertaken as part of the On-Farm Water Management (OFWM) Project in Pakistan has failed to reach the small farmer. This report summarizes results of a farmer survey conducted to determine the causes of this failure and offers suggestions to improve the program. A questionnaire was administered to a cross-section of 120 farmers in the Punjab to test groups of hypotheses regarding farm size and farmer categorizations (i.e., large, small, and very small farmers), the impact of the PLLP, and constraints to farmer participation. The PLLP's main benefits, according to farmers, were reduced irrigation time, higher yields, easier and more effective use of farm equipment (especially modern equipment), reduced hired labor costs and family labor time, and improved status. Despite the difficulty in defining the small farmer in Pakistan due to lack of reliable records on land ownership caused by land subdivisions within wealthy farm families, the authors were confident that the survey was accurate in showing that non-PLLP farmers tend to have smaller and more fragmented farms and to be poorer, less educated, and less influential than PLLP farmers; and to be unaware of the full PLLP. The major constraints to participation, in order of importance, were: (1) loss of a cropping season and lack of available land; (2) lack of knowledge and mistrust of PLLP or OFWM personnel; (3) costly equipment rental; (4) low subsidies and difficulties in receiving checks; and (5) a lack of access to the OFWM project. It was also found, however, that almost all nonparticipants were interested in the PLLP. To improve the PLLP's outreach to small farmers, the farmers stressed the importance of increased subsidies and OFWM effectiveness in contacting farmers and convincing them of PLLP benefits. The consultant team recommends improved determinants of land ownership, increased training and equipment for OFWM personnel to meet increasing demand for PLLP, increased use of private agencies and contractors to perform PLLP, and higher subsidies with simplified check cashing. The questionnaire and the survey's design and methodology are included.

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008 **PN-AAJ-159**

FOOD PROBLEMS AND PROSPECTS IN SUB-SAHARAN AFRICA; THE DECADE OF THE 1980's

U.S. Department of Agriculture, Economics, Statistics, and Cooperatives Service, International Economics Division.
1980, 431 p.

Sub-Saharan Africa (SSA) is the only region in the world where per capita food production declined in the last 20 years. This report analyzes the dynamics underlying agricultural production and consumption in this region between 1965–79 to predict food prospects for the 1980's. The consumption patterns, retail policies, potential for food production, and food supply policies in SSA countries are analyzed and a quantitative model projecting 1990 supply and demand is described in eight scenarios. If 1975 per capita income levels and producer price patterns prevail into the 1990's, SSA will have an import imbalance of 11.5 million metric tons. Moreover, to bring diets up to minimal calorie consumption levels—2,300 calories per person per day—will require an additional 0.9 million tons of food. These grim figures reflect low indigenous productivity. While land tenure patterns vary, most food production occurs at the subsistence level. Commercial inputs which can improve yields are not used and cultivation is done with simple hand tools. The natural environment also affects production. Tropical soils are fragile and weather cycles can vary dramatically. Knowledge of African food production systems is spotty, inhibiting development of new agricultural technology. Nevertheless, better use can be made of existing resources to improve productivity until research efforts can be exploited. Part of the problem lies with the structure of demand. Wheat and rice are in demand in urban areas, yet many African countries cannot produce wheat, while rice production is too expensive in others. To reduce imports, governments must shift dietary preferences to domestic crops (possibly with adverse political consequences). There is also a need to change the agriculture sector's traditional emphasis on developing cash crops for export while the high distribution costs of domestically produced foods make internal urban centers rely on food imports. A price policy encouraging domestic crops, timed with improvements in transportation facilities and food trade policies, is essential to reforming the system. Appendices include a 112-item bibliography (1962–80) in English, French, and German.

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009 **PN-AAJ-430**

INTERNATIONAL BIBLIOGRAPHY ON CROPPING SYSTEMS 1978

Ramos, M.M.
International Rice Research Institute (IRRI).
1980, 347 p.

Supplements International Bibliography on Cropping Systems 1973–74: PN-AAC-913, 333 p.; 1975: PN-AAF-460, 114 p.; 1976: PN-AAG-493, 193 p.; 1977: PN-AAG-967, 253 p.

Increasing food production in order to arrest hunger in developing countries depends, in large part, on improvements in agricultural research. To assist researchers in their efforts, this bibliography supplements and updates the International Bibliography on Cropping Systems, 1973–74 by providing 2,857 references (1973–78) written in English, Russian, Spanish, German, and French. Entries follow a classified arrangement and author and keyword indices are appended. Subject areas include the following: general works; physiology and biochemistry; crop ecology and meteorology; crop varieties and breeding; agronomy (general references, planting and harvesting, and cropping patterns, i.e., monoculture, ratooning, fallowing, intercropping and mixed cropping, rotation of crops, and shifting cultivation); soils (general references, soil chemistry and physics, fertility, management and tillage, soil biology and microbiology); fertilizers; irrigation; mechanization; plant protection (general references, diseases, insect pests, nematodes, and weeds); economic aspects (general entries, costs and returns, farm management and policy, statistics and statistical methods, marketing, trade, prices, credit, labor, land, and other resources); and social aspects.

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010 **PN-AAJ-485**

ADOPTION OF MODERN AGRICULTURAL TECHNOLOGY BY SMALL FARM OPERATORS: AN INTERDISCIPLINARY MODEL FOR RESEARCHERS AND STRATEGY BUILDERS

Leagans, J.P.
Cornell University, Department of Education.
1979, 56 p.

Cornell International Agricultural Mimeograph 69

Over one billion small farmers remain unaffected by even the most basic agricultural innovations. This study outlines a new model explaining small farmer innovation. Behavioral theories such as the human needs theory and Piaget's theory of structural change are reviewed to support the premise that farmer adoptive behavior is influenced by the cumulative valence of perceived incentives and disincentives. Several functional models such as the technology, institution-building, equilibrium, communication, conflict, and problem-solving models are then reviewed to establish a framework to correlate the complexity of factors affecting this behavior. Finding these models inadequate to explain small farmer innovation, the report develops the interdisciplinary behavioral differential model which considers the mental, behavioral, and environmental factors influencing technology adoption/nonadoption. The paradigm begins with a static phase in which incentives and disincentives to change are equal and behavior remains unchanged. The introduction of influence variables (e.g., technology, education) results in a dynamic phase in which the greater incentives to change trigger innovative responses. A

Students at Morogoro Agricultural College in Tanzania master modern farming methods while learning the age-old techniques upon which many Tanzanian farmers still rely.

semidynamic phase follows during which changes are increasingly adopted and innovation reaches an optimum level from which further innovation requires new behavioral influences. In summary, data suggest that small farmers remain low producers not because they are hostile to technical innovations, but because of system-associated barriers, i.e., they lack vital inputs. Innovation requires that farmers understand the new technology, that a complex infrastructure support system exists, and that farmers are able to combine these two complex sets of variables. It is precisely in combining these factors that farmers require outside assistance. Thus, the optimum degree of adoption occurs when a farmer is persuaded to adopt a technical input which, for him, is technically sound, economically feasible, physically possible, and politically and socially compatible. Studies to identify system-associated bottlenecks and analyze farmers' reactions to new technology are recommended. A 35-item bibliography (1953–77) is appended.

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011 PN-AAJ-498

RICE GRAIN PROPERTIES AND RESISTANCE TO STORAGE INSECTS: A REVIEW

Juliano, B.O.
International Rice Research Institute (IRRI).
1981, 9 p.

IRRI Paper Series, No. 56

Postharvest rice losses, a problem which is worsening as more and more countries achieve rice self-sufficiency, can be reduced by growing rice varieties resistant to rice storage insects. This report reviews the current state of research on a still largely neglected approach to developing resistant rice varieties—namely, by correlating varietal resistance with the grain's physicochemical properties. Research has shown that breeding characteristics such as intact tight hulls, a high degree of grain hardness, the presence of bran layers, high amylose content, high endosperm starch gelatinization temperature, low oil content, small and lightweight grain proportions, and low moisture content contribute to impeding a variety of storage insects—the rice weevil, the lesser grain borer, the Angoumois grain moth, the confused flour beetle, the Indian mill moth, the red flour beetle, and the almond moth. Processing techniques such as a high degree of milling and parboiling or heating the wet grain at 100° Centigrade also impede insect infestation. The report briefly analyzes the resistant characteristics of several varieties developed for U.S. production. The report suggests future research be conducted on the interrelationship between grain hardness and grain quality (as measured by protein and amylose contents, alkali spreading value, and gel consistency) and that varietal resistance to major storage insects be investigated using pairs of sister lines differing in the property in question. A 51-item bibliography (1946–80) is appended.

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012 PN-AAJ-522

PROCEEDINGS OF THE INTERNATIONAL WORKSHOP ON SOCIOECONOMIC CONSTRAINTS TO DEVELOPMENT OF SEMI-ARID TROPICAL AGRICULTURE, HYDERABAD, 1979

International Crops Research Institute for the Semi-Arid Tropics (ICRISAT).
1979, 444 p.

New technologies cannot be disseminated in developing countries without an understanding of local socioeconomic conditions. Such is the view adopted by the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) in sponsoring the International Workshop on Socioeconomic Constraints to Development of Semi-Arid Tropical Agriculture, held February 19–23, 1979 in Hyderabad, India, of which this report comprises the proceedings. The Workshop's primary aim was to consider ways and means of overcoming the various socioeconomic constraints to agricultural development in the semi-

arid tropics (SAT) and emphasis was focused on the role new technologies and/or policies could play in alleviating development constraints in SAT. The subject matter sessions addressed the analysis of existing farming systems and practices, socioeconomics of prospective technologies, field assessment of prospective technologies, issues in foodgrain marketing, the nature and significance of risk, rural labor markets, and the economics of improved animal-drawn implements and mechanization. Among the important observations, it was noted that larger farmers were earlier and more frequent adopters of new technology and that lack of capital is a major constraint to adoption. Research indicates that the sum total of current agricultural policies reduces farm income so that the incentive for increasing cereal production is probably nil. One common recommendation emerging from all sessions was the need to improve the methodological and empirical bases on which policy judgements are made. There is particular need for data on the importance of risk and uncertainty in determining farmer behavior in SAT regions as well as on labor bottlenecks and on the degree to which new technology constrains labor and affects wage rates. It was also recommended that greater emphasis be placed on understanding the nature of consumer preferences and that policy initiatives in foodgrain marketing consider the economic policies of SAT countries as well as the political situation of both donor and host government agencies. Appended are texts of papers presented in French and lists of country papers and of all workshop participants and observers.

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013 PN-AAJ-526

PLANNING TECHNOLOGIES APPROPRIATE TO FARMERS: CONCEPTS AND PROCEDURES

International Maize and Wheat Improvement Center.
1980, 77 p.

A key reason preventing farmers in developing countries from adopting fully the technologies recommended to them by researchers and extensionists is the inappropriateness of the technologies themselves. This manual was prepared to present procedures and guidelines to assist agricultural researchers in formulating technologies truly appropriate to farmer needs and is divided into three parts. Part I presents an overview of a research program aimed at developing appropriate technologies. Included are descriptions of on-farm and experimental station research—the key research procedures involved—and the government policy context in which research must occur. It is emphasized that successful research must proceed from knowledge of the farmer's circumstances, that is, the factors, both natural (e.g., climate and soils) and socioeconomic (e.g., farmers' goals, markets, national policy) that affect farmers' decisions on crop technologies. Part II describes procedures for obtaining information on these circumstances, with stress laid on the need to make the process a true collaboration between researchers and farmers. Specific procedures detailed are: gathering and analyzing pertinent background data from government and research reports; conducting an exploratory survey, that is, informal interviews with farmers and other knowledgeable individuals; and conducting a formal survey or questionnaire. Individual chapters treat how to develop questionnaire guidelines, sampling methods, and practical ways to make the survey truly collaborative. In Part III, methods are discussed for gleaning from survey results the information pertinent to planning crop research. In particular, the authors present guidelines for prescreening a few—two or three at most are recommended—"best-bet" technologies for research. A final chapter exemplifies use of these guidelines in two on-farm programs and one on-station program. The authors note that those who think reseachers should only go to farmers with finished technologies for demonstration will find this manual less useful than those who support on-farm research. Graphs, charts, and a 25-item glossary of terms are included. Short bibliographies are appended to each chapter.

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014 PN-AAJ-639

DEVELOPMENT OF LIVESTOCK, AGRICULTURE AND WATER SUPPLIES IN BOTSWANA BEFORE INDEPENDENCE: A SHORT HISTORY AND POLICY ANALYSIS

Roe, E.
Cornell University, Center for International Studies, Rural Development Committee.
1980, 61 p.

Occasional Papers No. 10

Colonial Botswana's subordination of its water supply and agricultural sectors toward increasing livestock production resulted in stagnant agricultural production levels lasting until its independence in 1966. This report serves as a policy context for rural development efforts in Botswana, formerly Bechuanaland, by listing and analyzing the major factors from 1895 to 1965 that affected its livestock, water supply, and agricultural sectors. During this period, livestock production was the Batswana's major source of trade income, despite the problems of disease, limited grazing areas (due to water scarcity), and a lack of sustained sales—the latter due largely to periodic South African cattle embargoes and weight/supply restrictions. A skewed distribution of livestock holdings occurred as droughts and the overuse of communal water sources led wealthier cattle owners to install private boreholes and cattle posts, thereby ensuring their herds' access to water while smaller herds (and their owners) suffered disproportionately. There were also problems facing the agricultural sector, namely water scarcity, labor shortages, a lack of high-yield/drought-resistant grains with low cultivation/harvesting requirements, and a lack of economic incentives for sustained production. As a result, agricultural

production never increased beyond subsistence levels. The following contradictory economic dynamics contributed to the the livestock sector's prevalence over the agricultural sector: (1) a low agricultural output which caused workers to migrate to higher-paying jobs, the resultant labor shortage reinforcing subsistence-level production; (2) a negative relationship of children's school attendance to agriculture and livestock management; (3) a negative relationship of cattle sales to grain production, resulting in greater grazing pressures at water points; (4) a substantially greater allocation of research, innovation, and funding in livestock than in agriculture—enhancing the livestock sector's investment attractiveness; and (5) a subsidization of the livestock sector, especially in large-scale water programs. Appended are a 45-item (1920–79) bibliography and a 22-item (1905–79) list of table and data sources.

AID/ta-BMA-8 931113700

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015 **PN-AAJ-640**

ICTA IN GUATEMALA: THE EVOLUTION OF A NEW MODEL FOR AGRICULTURAL RESEARCH AND DEVELOPMENT

Gostyla, L.; Whyte, W.F.
Cornell University Center for International Studies, Rural Development Committee.
1980, 53 p.

Special Series on Agriculture Research and Extension

Agricultural research can have no impact upon small farmers' cultivation practices unless it understands farmers' real problems and defines efficiency in farmers' terms. Traditional research and development efforts—unilateral flows of initiative and information directed by national planners, executed by technicians through commodity programs, and imposed upon farmers—often result in production techniques that are rejected by small farmers. This report describes the development of Guatemala's Institute of Agricultural Science and Technology (ICTA), which is dedicated to a decentralized research methodology designed to make research programs responsible for the adoption of appropriate agricultural techniques by including the contributions of farmers and social scientists. Under ICTA's interdisciplinary research program, mainly developed by its Socio-Economic Unit (SEU), natural and social scientists survey farmers to identify homogeneous groups and their production constraints. The farmers then record their cultivation practices, supplying data about annual crop labor/resource investments. Experimentation with specific treatments, such as agronomic practices or crop varieties, is based on farmer information and the results of controlled tests at production centers. Using the farmers' traditional techniques, an agronomist and farmer test the selected treatments and then apply them to larger areas at different sites. In the next phase, the farmer tests the treatments alone; ICTA personnel visit to record information and conduct evaluations. Problems arose in the initial implementation of this approach, as technicians deprecated farmer input and SEU's low-level regional presence was often erratic. The situation improved as technicians began to realize the benefits of farmer participation and as SEU sent adequate personnel into needed areas. The use of leadership farmers to monitor recordkeeping and test sites also has been helpful. An indication of the obstacles facing those introducing such innovations is provided in the authors' histories of ICTA and SEU, including the latter's conflicts with external and internal proponents of traditional methods and relations with similar institutions.

AID/ta-BMA-8 931113700
Also available in Spanish: PN-AAJ-641, 108 p.

Paper copy $ 6.89 Microfiche $ 1.08

016 **PN-AAH-369**

MARKETING FIN FISH FROM THE PACIFIC COAST OF GUATEMALA

Lesser, W.; Weaver, T.
Cornell University, Department of Agricultural Economics.
1980, 32 p.

Cornell International Agriculture Mimeograph No. 67

As a partial remedy to the current lack of specific information needed to plan the development of Guatemala's fishing sector, this bulletin analyzes the marketing structure for ocean fin fish from the country's Pacific Coast. Marketing follows two distinct channels, one for the artisanal, the other for the industrial sector. Artisanal fishing is labor-intensive and its products are traditionally sold in the public markets. Fishermen are limited to a small catch due to difficulty in ocean access and primitive fishing technology. Market margins within the artisanal sector are not high. The marketing system is competitive, and individuals are socially constrained from increasing the size and profitability of their business. Although this sector supplies the bulk of fresh fish consumed domestically, it is limited by its failure to transport fish to remote, potentially protein-deficient areas. The industrial sector, primarily a shrimping industry which handles fresh fish as an incidental catch, has a more highly developed market system. This sector deals almost exclusively with supermarkets, specialty stores, and institutional buyers. Retail prices for fish supplied by this sector are comparable with those charged in the public markets supplied by the artisanal sector. It was not possible to make reliable estimates of the marketing margins for fish supplied through the industrial sector, because industrial firms do not keep separate facilities or accounts for shrimp and fin fish and because their capture and marketing operations are highly integrated. However, fin fish do appear to be a profitable product line for the sector. The study concludes with nine suggestions aimed at stimulating production or expanding markets: (1) establish a small trawl fishery; (2) market the bottom fish in cake form; (3) promote underutilized species such as bonito and shark; (4) acquire improved equipment; (5) increase artisanal fishermen's incomes; (6) develop access to credit markets; (7) penetrate more remote interior markets; (8) promote the use of more efficient containers for transporting fish; and (9) reduce the

number of retailers in the public markets. A 22-item Spanish-language bibliography (1967–73) is appended.

AID/ta-BMA-8 931113700

Paper copy $ 4.16 Microfiche $ 1.08

017 **PN-AAJ-627**

STOCK ASSESSMENT FOR TROPICAL SMALL-SCALE FISHERIES: PROCEEDINGS OF AN INTERNATIONAL WORKSHOP HELD SEPTEMBER 19-21, 1979, AT THE UNIVERSITY OF RHODE ISLAND, KINGSTON, RHODE ISLAND

Roedel, P.M.; Saila, S.B.
University of Rhode Island, Center for Marine Resource Development.
1979, 204 p.

As developing nations increasingly turn to the sea for food and export products, coastal artisanal fisheries threaten to deplete area aquatic resources. This report outlines the results of an AID-funded workshop conducted by the University of Rhode Island on the use of stock assessment for small-scale tropical fisheries. The workshop sought to create a dialogue between fishery administrators from developing countries and theoreticians to enable the latter to more effectively propose new approaches to assessment. The report consists of the 15 papers (most with bibliographies; some of which have German titles) presented at the workshop by experts from Belize, Canada, Italy, Malaysia, New Guinea, Nigeria, the Philippines, Thailand, and the United States. The two key problems regarding stock assessment among small-scale fisheries are the lack of effective structures to allow an information flow from fishery biologists to planners and policymakers, and the inadequate attention given to the economic and sociocultural aspects of small-scale fisheries. Additional data collection and interpretation difficulties include the harvesting of many different species, complicated species interactions, unpredictable growing seasons, sensitivity of tropical ecosystems to perturbations, and the use of numerous landing points and different varieties of fishing gear. Further, stock assessment procedures used for industrial, temperate, or cold water fisheries are not applicable. The workshop recommended that: (1) yields in different locations and environments be studied to estimate resource levels and formulate development and management strategies; (2) the use of several types of small-scale fishing gear in various locations be studied to determine relative stock densities and to establish a basis for correlating data on fish caught with different equipment in the same location; (3) fisheries models showing population growth rates concurrent with depletion rates be altered for use in multi-species, multi-equipment environments; and (4) research be done to provide policy analysis studies of management and development options for small-scale fisheries. A list of the workshop participants and support staff are included.

AID/ta-G-1404

Paper copy $26.52 Microfiche $ 3.24

018 **PN-AAJ-653**

SMALL-SCALE FISHERIES IN CENTRAL AMERICA: ACQUIRING INFORMATION FOR DECISION MAKING

Rhode Island University, International Center for Marine Resource Development.
1979, 612 p.

Fish, up to 75% of which is supplied by small-scale fisheries, provide well over 30% of the animal protein intake in many African and Asian countries. According to the Food and Agricultural Organization, the annual growth rate of developing country marine food fish production can be increased 35–50%. Small-scale fisheries thus have an obvious potential for alleviating developing world hunger problems, especially given the new opportunities for fish production opened up by the international acceptance of the extended marine economic zone during the 1970's. To help provide decisionmakers with the extensive information base they need to plan and develop small-scale fisheries, A.I.D. financed a 4-year investigation of small-scale fisheries in Costa Rica, El Salvador, and Guatemala. This study, the results of which are presented in this report, was multidisciplinary in nature, involving specialists in fish biology, food science, resource economics, anthropology, and development administration. To establish the context of the research, the initial section of the report describes the structure and role of information systems, the general nature of developing country small-scale fisheries, and the research setting in the above-named countries. The next two sections contain, respectively, the data collected by specific discipline field tests of various fishery sectors and the analyses of these data. Included are biological surveys of fisheries resources, economic and anthropological surveys of the harvesting sector, food science and technology surveys of handling and processing methods, economic surveys of marketing and consumption, and a survey of fisheries administrators in government. A final section makes recommendations regarding data collection, with emphasis on specifying the quantity and quality of data to be collected in advance; and discusses policy implications in the areas of resource assessment, the fish capture sector, marketing and distribution, fish handling, fish consumption, and fisheries development adminstration. Included are 380 Spanish and English references (1934–79), plus diagrams, maps, and questionnaires.

AID/CSD-2455 931011300

Paper copy $79.56 Microfiche $ 7.56

019 **PN-AAJ-655**

AN EVALUATION OF THE FISHERIES SECTOR IN OMAN

Roedel, P.M.
Omani-American Joint Commission for Economic and Technical Cooperation.
1981, 50 p.

No reliable data exist on the size of Oman's fish catch—estimates vary from 46,000 to 200,000 metric tons. This and other problems that the Omani Government (OG) must overcome to successfully promote fishing as a source of food and income for its citizens are the subject of this report. Currently, there is a strong demand for fish, both for consumption and for export, and the catch is high quality, e.g., tuna, mackerel, sea bass. The OG has provided fishermen with substantial support, including vessels, motors, and repair and cold storage facilities, all at subsidized prices. However, handling, preservation, and distribution are characterized by poor sanitation and quality control; the only industrial-scale operation is run by a Korean firm under a concession agreement; a comprehensive fisheries law has not been enacted; the OG lacks the scientific competence to establish the planned marine science center; operation of a formal extension program has been delayed; and there is a striking lack of trained people to administer and manage the growing fishing industry. The author analyzes the relevancy and feasibility of projects in fishery statistics, training, extension, and marine science and recommends them for OG funding. Although the data are inadequate, the gap between current catch and a safe level of potential harvesting must be estimated to be at least 25%. For the OG (or any developing country) to effectively and successfully exploit such potential, the author concludes that the following are necessary: (1) a long-range, regularly updated national fisheries policy with supporting laws; (2) trained administrators, scientists, and support personnel and an internal training program; (3) an up-to-date statistical system; (4) an adequately equipped scientific research office; (5) extension services; (6) a fish culture program; (7) participation in regional and global fishing organizations; (8) a program to finance capital development and provide loans to fishermen; (9) concern for the environment and other marine resource users; and (10) competence in product utilization, food technology, and quality control. A 25-title bibliography (1950–81) is appended.

NEB-0101-S-00-1035-00

Paper copy $ 6.50 Microfiche $ 1.08

020 **PN-AAG-788**

SUGGESTED FERTILIZER-RELATED POLICIES FOR GOVERNMENTS AND INTERNATIONAL AGENCIES

Hignett, T.P.
International Fertilizer Development Center.
1977, 65 p.

Technical Bulletin IFDC-T-10

To provide an adequate food supply for their growing populations, developing countries should plan to increase their use of fertilizer at least five-fold by the year 2000. Achieving this goal will require that a high priority be assigned to increasing fertilizer production, distribution, and use with maximum efficiency. This report suggests several policies that may be employed and steps individual countries may take to pursue such goals. Exploration of the extent and quality of raw materials needed for fertilizer manufacture can be stimulated through attracting investment capital and providing tax incentives to invest. Fertilizer production and distribution systems, emphasizing increased production capacity at reduced costs, should be planned for maximum efficiency and economy using technology appropriate to the needs and abilities of the countries. Stimulation of fertilizer use should emphasize agroeconomic research and farmer education. Manpower utilization and development should be given due consideration in the selection of level of technology, in training programs, and in personnel policies that reward efficiency and achievement. Possibilities for integrating fertilizer manufacture with other industries should be sought and pursued when advantageous. International organizations can assist in increasing the quantity and efficiency of fertilizer use through promotional activities; development and use of improved forms of fertilizer materials; improved application and proper balance of nutrients; development of new varieties that use fertilizer more efficiently or supply part of their fertilizer requirement through symbiotic nitrogen fixation; and provision of investment capital when none can be obtained elsewhere. Studies on efficient use of organic waste materials and other studies on the economics of manufacture, distribution, consumption, and demand of fertilizers and related environmental aspects should be performed to determine the best use of resources to meet the present and future needs. International agencies should also be responsible for the dissemination of this information. Eight bibliographic entries (1973–76) are cited for further reference.

AID/ta-G-1218 GTS 931005400

Paper copy $ 8.45 Microfiche $ 1.08

021 **PN-AAH-333**

EVALUATION OF IRRIGATION ACTIVITIES IN BOLIVIA

Harvatin, J.F.
Devres, Inc.
1980, 44 p.

Two-thirds of Bolivians are farmers, yet due to the low level of agricultural productivity caused largely by inadequate irrigation techniques, agriculture constitutes only one-third of the nation's GNP. This study, written in Spanish, evaluates current irrigation practices and the potential for improving irrigation in Bolivia. Although Bolivia has adequate subterranean and superficial water supplies as well as marked rainy seasons, a lack of funds, few trained personnel, and difficult topography have permitted only a few irrigation projects to be developed. Additionally, farmers use primitive irrigation techniques, such as flooding, which are ineffective and promote soil erosion. While large reservoir projects have been slightly more successful, they also lack adequate soil maintenance techniques and are responsible for higher soil salinity levels. The use of river water in a number of projects threatens to contaminate crops and spread

disease as the water often contains sewage and human wastes. The viability of irrigation systems in Bolivia is unascertainable without: (1) accurate data on rainfall, water levels, climate and soil content; (2) educational outreach programs on soil maintenance and irrigation uses; (3) increased numbers of engineers and technicians; (4) reliable data on current farm production; and (5) increased management effectiveness and resources. Although a full cost-benefit analysis of levels of production with irrigation is impossible without these data, existing data indicate well-run irrigation projects could increase farm output 50–100%. Due to limited resources for implementing irrigation projects, priority should be given to vineyards in Tarija, vegetables and alfalfa in Cochabamba, and corn, potatoes, and fruit in the valleys. New projects in marginal areas will be more difficult due to the steep slopes, narrow valleys, adverse weather conditions, and poor soil content. There is little hope of quick improvement in the Bolivian irrigation system, but if large-scale projects are emphasized, management, training, and extension efforts can be developed simultaneously. A bibliography (1973–77), terms of reference, and a list of interviewees are included in English and Spanish.

AID/SOD/PDC-C-0223 511000001
Also available in English: PN-AAH-332, 53 p.

Paper copy $ 5.72 Michrofiche $ 1.08

022 PN-AAJ-009

MATCHING CROPPING SYSTEMS TO WATER SUPPLY USING AN INTEGRATIVE MODEL

Reuss, J.O.
Colorado State University, Engineering Research Center.
1980, 217 p.

Water Management Technical Report No. 62

Matching cropping systems to available water supply is a major element in the complex process of choosing a suitable cropping system. This manual, using examples from studies conducted in Pakistan, describes an integrative mathematical model to assist in this process. The first step in evaluating cropping systems relative to water supply is to determine the climatic potential for crop water use, or "potential evapotranspiration" (E_{tp}). E_{tp} may be defined as the water use of some standard reference crop growing as if water were not limiting. (The Penman and the Modified Jensen-Haise methods of calculating E_{tp} are used.) The next step is to estimate actual evapotranspiration that will occur in the field; that is, the crop evapotranspiration that would normally occur plus the excess transpiration that would occur from crop and soil surfaces that may temporarily be abnormally wet from irrigation or rainfall. A computer program has been developed to calculate consumptive use for eight common crops in Pakistan—citrus with a cover crop, citrus without cover, cotton, berseem (Egyptian clover), maize, rice, sugarcane, and wheat. The input required for these calculations is a file of weather data containing the necessary information for calculating E_{tp}. Next, calculations of crop consumptive use (for both single crops and crop mixes) are integrated with the irrigation supply requirements by use of a simulation model. The model is programmed in the HPL language for use on the Hewlett Packard model 9825A desktop calculator. In a less technical final section, use of the linear programming (LP) technique for crop selection and/or water pricing is explained. Possible strategies include combining crops whose peak irrigation demands are complementary, selectively stressing some crops in order to stretch a fixed supply of water, and substituting more or less water-intensive crops for one another. It is shown that the LP technique complements the simulation model, with the latter providing essential data for LP optimization. The manual includes a list of references (13 entries, 1948–79) and two appendices (methods for calculation of important model parameters and a program guide, documentation and listings).

AID/ta-C-1411 931048900

Paper copy $28.21 Microfiche $ 3.24

023 PN-AAJ-010

FIELD EVALUATION OF METHODS FOR MEASURING BASIN IRRIGATION PERFORMANCE

Kundu, S.S.; Skogerboe, G.V.
Colorado State University, Engineering Research Center.
1980, 136 p.

Water Management Technical Report No. 59

Even though basin irrigation methods have been practiced for millenia and are used today to irrigate more of the world's land than any other method, little research has been conducted to evaluate the hydraulic performance of basin irrigation or to develop criteria for improving present basin irrigation practices. To promote more systematic investigation, this report describes field procedures for evaluating basin irrigation performance. The procedures, tested in the Grand Valley area of Western Colorado, entail organizing a basin into a grid system. Calculations are made for each area and average figures are computed to represent the basin as a whole. In the experiment, the ground was leveled, planted with sweet corn, and irrigated five times. Each plot was monitored for inflow, discharge, depths, and corresponding times. Three methods for calculating infiltrated water depths are then described and compared. The adjusted infiltration equation and split-time infiltration methods require an infiltrometer test and the infiltration opportunity times of each grid area. The accuracy of these methods depends essentially on the accuracy of the infiltration equation developed by the cylinder infiltrometer tests. The modified volume balance technique is based on measured volumes of inflow and water surface storage at several times during the water front advance and represents the actual infiltration characteristics of the entire basin. This method's accuracy depends on the observer's visual judgment and the levelness of the basin. Although data were insufficient for extensive conclusions, analysis indicates that the modified volume balance method is highly reliable in the sense that the infiltration equations thus developed include all the attributes of both the soil and irrigation conditions. A 7-item bibliography (1942–78), a list of 68 related publications, and tables and graphs on station area,

infiltration functions, advance and recession contours, applied water depths and infiltration opportunity times, estimates of applied water depths by the modified volume method, and sweet corn yield, are appended.

AID/ta-C-1411 931048900

Paper copy $17.68 Microfiche $ 2.16

024 PN-AAJ-011

WATERCOURSE IMPROVEMENT RESEARCH IN PAKISTAN

Kemper, W.D.; Clyma, Wayne; Skogerboe, G.V.; Trout, T.J.
Colorado State University, Engineering Research Center.
1980, 106 p.

Water Management Technical Report No. 56

In 1971, Colorado State University (CSU) Water Management Field Party and Pakistani investigators discovered that 45% of all the water in Pakistan's man-made irrigation systems was lost before ever reaching arable land. In 1977, A.I.D. funded a water management research program to provide the basis for future development and redesign of Pakistan's national irrigation system. This report outlines the investigation of and reasons for water loss and the ensuing development of an alternative water management program. The primary causes of water loss were identified as high porosity of upper portions of banks due to burrowing animals and insects; thin, fragile banks near watercourse junctions due to soil borrowing for dams; rising levels of water in the watercourse due to vegetative growth and sedimentation; and difficulty in organizing farmers to perform regular maintenance. Experimental masonry and concrete watercourses were built by the Government of Pakistan (GOP) and given to farmers, but the costs were prohibitively high, the quantity of cement needed was too great, and farmers, having no investment in the system, failed to maintain the watercourses. Other lined watercourses constructed by local farm labor using GOP-provided materials were better appreciated and maintained but took too long to build and still required too much cement. Cooperative improvements of earthen channels by farmers using government materials and design, though, had a favorable benefit/cost ratio (3:1) and were eagerly accepted by farmers. Although subsequent studies showed that regular maintenance of existing canals would have saved almost as much water and at a lower cost, the new system was preferred by farmers and, as a result, both GOP and USAID officials asked the CSU/GOP team to implement the plan nationally. Since full benefits were realized only by those farmers who organized themselves to regularly maintain the system, the report recommends that an education program be established to clearly demonstrate the cause and effect nature between maintenance and reduced losses and that laws be passed to enable local leaders to organize farmers and penalize those not contributing. A 26-item bibliography (1965–80) is appended.

AID/ta-C-1411 931048900

Paper copy $13.78 Microfiche $ 2.16

025 PN-AAJ-012

WATERCOURSE IMPROVEMENT MANUAL

Trout, T.J.; Kemper, W.D.
Colorado State Unversity, Engineering Research Center.
1980, 266 p.

Water Management Technical Report No. 58

In the arid and semiarid regions which comprise 50% of the world's arable land, water is the critical input on which food production increases depend. This manual discusses processes (of interest to planners) and techniques (of use to engineers, economists, and sociologists) to improve the efficiency of tertiary irrigation conveyance systems (ditches, laterals, and other small watercourses) which convey water from large canals to individual farms. Although the procedures outlined in the manual were developed on the basis of conditions in Pakistan, they are applicable where similar conditions obtain. The manual suggests the following procedure. (1) Analyze the extent and causes (e.g., permeable soils, poor maintenance, excess water supply) of channel losses and evaluate channel improvements in terms of the lost water's value to other users and its marginal value to crop production. (2) Develop specific remedies (including physical changes to the channels and conveyance system or changes in operation and management), test them under controlled conditions, and cost them realistically. (3) Package successful techniques, test these on a larger scale, and adjust the package as practical constraints arise. (4) Test the final version of the package in a full-scale pilot project. (5) Study local social and organizational structures and, where necessary, work to make these local structures receptive to new guidelines and policies regarding channel improvement, utilization, and maintenance. (6) Finally, apply the successful improvement package to the entire target area. The authors note in conclusion that despite any channel improvements, it is afterwards, when the channels must be maintained and the supplemental water put to good use, that the most difficult part of the process begins. A 30-item bibliography (1947–80), sample data collection sheets, and information on field, watercourse, and topographic mapping, differential leveling, channel design, choice of cross-sectional shapes, allocation of alternative improvement techniques, and overviews of two Pakistani training programs are appended.

AID/ta-C-1411 931048900

Paper copy $34.58 Microfiche $ 3.24

026 PN-AAJ-0I4

SUMMARY OF SKIMMING WELL INVESTIGATIONS

McWhorter, D.B.
Colorado State University, Engineering Research Center.
I980, 87 p.

Water Management Technical Report No. 63

Exploitation of groundwater supplies for agricultural, municipal, and industrial uses is severely hampered in many regions of the

world by the encroachment of unusable salt water following fresh water withdrawals. Perhaps the most important example of salt water encroachment in inland aquifers is in the Indus River Basin of the India-Pakistan subcontinent. This report summarizes research on water flow in fresh-saline water aquifers, with particular reference to Pakistan, conducted at Colorado State University (CSU). Because a high water table underlies the country's extensive irrigated surface area, Pakistan suffers widespread problems of waterlogging and salinity, necessitating the installation of drainage and reclamation programs. Drainage is complicated by the presence of highly saline water underlying virtually all of the relatively fresh water throughout the aquifer. The only conceivable long-term solution is to "skim" the fresh water from the aquifer with minimal disturbance to the saline zone. Research has been conducted at CSU on the mechanisms of fresh-water flow above a saline zone and procedures have been tested for exploiting the fresh water zone without entraining (carrying along) the underlying salt water. A laboratory model study of salt-water upconing beneath pumping wells has also been designed and theoretical studies have been undertaken in which a fresh-water system was treated as two zones with distinct densities. Flow in both isotropic and anisotropic aquifers was modeled to design criteria for wells and for horizontal drains capable of skimming the fresh water without substantial entrainment of salt water. In addition, a mathematical model was developed that treated the system in terms of flow of a non-homogenous liquid. Field experiments on actual system behavior and on the practicality of skimming wells were carried out in Pakistan. In designing wells, the authors recommend that the salinity profile be done first to estimate the thickness of the fresh water layer, that the screened portion be located in the upper part of the fresh-water zone, and that good well construction practices be used to minimize well losses. Appended is a 17-item bibliography (1935–75).

AID/ta-C-1411 931048900

Paper copy $11.31 Microfiche $ 1.08

027 PN-AAJ-015

TRAINING MANUAL FOR AGRICULTURAL WATER MANAGEMENT SPECIALISTS

Westfall, D.G.
Colorado State University, Engineering Research Center.
1980, 675 p.

In Water Technical Report No. 60

Improved on-farm water management (OFWM) is a vital area for improving agricultural production in developing countries. This training manual contains the lesson plans and outlines the course of study given to water management extension specialists ("agricultural officers") in the OFWM Development Project in Pakistan before they are assigned to the field team. The course's major objectives are to develop the participant's confidence in his ability to work with farmers; provide him with the skills needed to convince farmers to undertake a water-course improvement or a cleaning and maintenance program and how to supervise these programs; and equip him with knowledge and skills so that he can demonstrate to farmers how more efficient use of irrigation water can increase crop production. This interdisciplinary training program encompasses seven professional areas: (1) Irrigation and drainage studies outline courses on the evaluation and improvement of irrigational practices. In addition, classes on watercourse improvement, design, cleaning, and maintenance are provided. (2) Agricultural extension training involves organizing and implementing a watercourse cleaning and maintenance program. Also, methods on agronomic and irrigation improvement are illustrated. (3) Agronomic studies provide training on crop production guidelines, the implementation of field demonstrations, and field trips. (4) Soil science studies discuss areas such as water quality, and soil and fertilizer components. (5) Farm power and machinery courses cover the operation of farm equipment under field conditions. (6) Farm management studies include classes on farm budgeting and economic principles of farm management. (7) Rural sociology training demonstrates how to organize a watercourse committee and implement a watercourse cleaning and maintenance program. The lesson plans are developed for an audience with B.S. degrees. Graphs and tables are provided throughout the lessons to facilitate the learning process. The course is 103 days in length, of which 71 days are spent in practical fieldwork. In addition, 60 water management technical reports presented by Colorado State University are listed and priced.

AID/ta-C-1411 931048900

Paper copy $87.75 Microfiche $ 7.56

028 PN-AAJ-308

THE CITANDUY RIVER BASIN DEVELOPMENT PROJECT; PANAWANGAN PILOT WATERSHED IMPLEMENTATION AND EVALUATION REPORT

PRC Engineering Consultants, Inc.
1980, 134 p.

Severe erosion of irreplaceable topsoil in Indonesia decreases agricultural productivity, requiring annual rice imports amounting to 2.6 million metric tons. The Panawangan Pilot Watershed Project was designed to reverse this trend by establishing soil and water conservation practices capable of maintaining high production levels in the dryland farms of the Citanduy River Basin. This report evaluates the project in terms of its soil conservation practices, agricultural and community development programs, economics, and participating agencies. To reverse topsoil erosion in dryland areas caused by poor land use and increasing population pressures, the Panawangan Project has promoted improved soil conservation practices such as bench terraces, waterways, gully plugs, cutthroat flumes, and sediment traps, and has begun collecting soil erosion data. The project has also initiated an agricultural development program consisting of improved agronomic practices such as variety and fertility trials and multiple and mono-

culture cropping; a grass revegetation program; planting of trees as cash crops and for lumber and fuel; and livestock, beehive, and fish pond production programs. Besides providing technical assistance to farmers in the above and other areas, the project has actively engaged farmers in project implementation through community and farmer training programs, including special sessions to inculcate the project's basic concepts, especially by convincing farmers that the project will help increase farm production. Consultants have coordinated the activities of the wide range of local and national Indonesian agencies and research institutes involved in implementing this USAID-supported project. The project's most recent development (3/79) has been the establishment of nine mini-watershed demonstration sites. Government use of these pilot sites as a means of extending the Panawangan Project's successes is recommended. Also recommended is a low-interest loan program to enable dryland farmers to finance the inputs such as improved crop varieties and access to cooperatives and technical assistance which are required to increase production. A 31-item bibliography (1954–78) is appended.

AID/SOD/PDC-C-0215 497024500

Paper copy $17.42 Microfiche $ 2.16

029 **PN-AAJ-413**

REPORT OF A PLANNING WORKSHOP ON IRRIGATION WATER MANAGEMENT

International Rice Research Institute (IRRI).
1980, 177 p.

Irrigation expansion has become vital to agricultural development in the major rice-growing countries over the last 10–15 years. As part of its efforts to increase irrigation efficiency and eliminate the technical, economic, and socioinstitutional problems that impede rice production, the International Rice Research Institute (IRRI) hosted a workshop on Irrigation Water Management held at IRRI, March 26–30, 1979. The topics covered at the workshop, the proceedings of which are here presented, were: (1) managing canal irrigation in the 1980's; (2) hardware and software combinations in irrigation management; (3) an economic analysis to support irrigation investment and management decisions; (4) solving irrigation system management problems; (5) studies in water management economics at IRRI; and (6) selected research findings in water allocation, distribution, and use criteria for irrigation system design and management. Among the workshop's recommendations in engineering- and management-related research were: (1) identify data needed to improve irrigation system design and management; (2) find efficient alternatives to effect irrigation water savings; (3) find ways to justly divide responsibility between agency personnel and farmers; and (4) study the relative benefits of small, medium, and large systems. Socioinstitutional research recommendations included: (1) continuing on-the-job training in research; (2) creating a data base available to individuals, organizations, and governments; and (3) coordinating economic consequences programs with water management programs to determine the effect of irrigation on future population growth in rural areas, the man-land ratio, on-farm employment, the environmental impact of irrigation, and inequities between rainfed and irrigated areas. Lastly, recommendations regarding economics- and investment-related research were to develop: (1) a postproject evaluation handbook; (2) methodologies for estimating employment and income effects of irrigation projects; (3) a cost/benefit analysis of different distributional and on-farm irrigation facilities; and (4) a procedure to determine the economic and operational factors for conjunctive use of surface and groundwater.

AID/DSAN-G-0083 931082600

Paper copy $22.10 Microfiche $ 2.16

030 **PN-AAG-904**

A WORLD BIBLIOGRAPHY ON GOATS

Sands, M.; McDowell, R.E.
Cornell University, Department of Animal Science.
1979, 117 p.

Cornell International Agriculture Mimeograph No. 70

Ninety-five percent of the world's 410 million goats are found in developing countries. The vast majority of them are multipurpose animals, contributing 1.65% to the world's milk supply in 1974 and—since most goats are slaughtered at the village level—far more than the estimated 5.7% of the 17.9 million metric tons of 1976 world production of edible protein from slaughterhouse animals. Exporting of mohair from Angora goats in such countries as Turkey and Namibia and of goat skins in Nigeria attests to the foreign exchange importance of goats. Of the four major systems of goat production—intensive commercial production herds; large nomadic herds; large sedentary herds found on the outskirts of urban areas; and small household units kept mainly for subsistence needs—the first system is found mostly in developed countries (La Comerca Lagunera in Mexico being a notable exception). The other three systems are practiced in various combinations throughout most of the tropics and subtropics. Because they are cheaper and easier to use than cattle, goats are often used in nutrition research, and 13 U.S. institutions are currently engaging in collaborative research programs using goats (as well as sheep) to increase animal products on small farms in developing countries. International centers working on goat research include the Consultative Group on International Agricultural Research (CGIAR), the International Livestock Centre for Africa (ILCA), and the International Laboratory for Research on Animal Diseases (ILRAD). In response to the growing importance of and worldwide interest in goats, this 90-page, alphabetically arranged and numbered bibliography on goats has been compiled. Entries are drawn from all over the world, but are listed almost exclusively according to English titles. A topical index facilitates use of the bibliography, correlating bibliographic items with goat breeds and origins; the role of goats in developing world agriculture; the countries in which

goats are found; and biological data such as behavior, birth weight, growth rate, health, management, meat production, milk composition and yield, milking machines, nutrition and feeding efficiency, physiology, and reproduction.

AID/ta-BMA-8 931113700

Paper copy $15.21 Microfiche $ 2.16

031 PN-AAH-316

REPORT ON THE DEVELOPMENT OF GOATS IN ASIA

Devendra, C.
Animal Production and Health Commission for Asia.
1979, 77 p.

Recent interest in goats by Asian countries has led the Regional Animal Production and Health Commission for Asia, the Far East, and Southwest Pacific (APHCA) to initiate a program on goat development. This report presents a state-of-the-art paper on Asian goat husbandry presented at the March 1979 APHCA seminar on Asian goat development, along with a summary of the seminar itself. After brief background sections, the paper discusses goat population and distribution within the APHCA region. Findings indicate that goats represent 25.6% of the total grazing ruminants in the countries east of Iran and that between 1965 and 1977 the goat population increased 3.5 times faster than sheep. The next section treats the important functions of goats, such as their contributions of meat, milk, manure for fertilizer, and skins. After a brief section on goat ownership, five categories of goat production systems are discussed: tethered, extensive, intensive, semi-intensive, and integrated (with cropping systems.) Next, breeding practices and constraints to goat production, such as lack of understanding of the value of goats and inadequate control of diseases harmful to goats, are discussed. Strategies for developing and exploiting the characteristics of goats are presented in a concluding section of the paper. The objectives of the APHCA seminar were to examine systems of goat production and constraints to development; suggest improvements in the present system; formulate national and regional goat development programs; and indicate socioeconomic benefits of such programs. The major topics covered at the seminar, which included country statements from 10 APHCA nations, were breeding, nutrition, physiology, and health. Final conclusions and recommendations were to: (1) hold regular meetings of goat production specialists; (2) establish an advisory committee to coordinate programs; (3) provide graduate, technical, and extension training in program development; and (4) make each APHCA country responsible for submitting projects based on the action programs developed at the seminar. Appended to the paper are a 23-item bibliography (1970–78), a list of seminar participants, and nine of the country papers.

AID/DSAN-G-0032 931115500

Paper copy $10.01 Microfiche $ 1.08

032 PN-AAH-958

AGRICULTURAL SECTOR ASSESSMENT; LIVESTOCK SUBSECTOR FOR HAITI

Conrad, J.H.
Florida University, Department of Animal Sciences.
1979, 72 p.

Livestock production, although often studied independently of other agricultural activities, is closely linked to cropping systems and to the use of land and labor resources. This report assesses the livestock subsector in Haiti as an integral part of the country's crop/farming system and suggests strategies for Government of Haiti (GOH) action. The first section examines the diversity of livestock types in Haiti's five departments and the four most commonly used management methods—free roaming, staking out, open range herding, and fenced pasture. The author advocates the inclusion of livestock enterprises in farming systems to improve farm efficiency, food production, and profitability. Potential advantages of livestock development, such as improved soil structure from the growth of forage legumes and use of crop residues, are listed. The author next discusses policy reformulations which should be undertaken by the GOH, especially the need for a national livestock policy. GOH interventions should focus on adapted technology, appropriate training, and improved infrastructure. A further recommendation is to conduct an in-depth review of GOH livestock programs to analyze the reasons for their many failures. The GOH should support breed improvement activities of the private sector rather than attempt to manage a national network of breeding stations. Five alternate strategies for GOH livestock interventions (and the specialists needed for GOH implementation) are presented: (1) research into the role of livestock in diverse small farm systems; (2) improvement of livestock nutrition and management, especially use of agricultural byproducts; (3) encouragement of genetic improvement and selection; (4) research of appropriate technology for small farm livestock management; and (5) provision of technical assistance and credit in support of livestock enterprises. Appendices on proposed livestock-related projects, rainfall/soil information, development of beef cattle production, an analysis of liver and rib bone samples, use of sweet potato residues as cattle feed, and a paper on swine nutrition conclude the report, along with a 29–item bibliography (1955–74) and 10 supporting tables.

AID/la-C-1261

Paper copy $ 9.36 Microfiche $ 1.08

033 PN-AAH-139

PLANNING AN INTERNATIONAL NETWORK OF LEGUME INOCULATION TRIALS: THE PROCEEDINGS OF A WORKSHOP HELD AT KAHULUI, MAUI, HAWAII, JANUARY 15-19, 1979

Harris, S.C.
University of Hawaii, College of Tropical Agriculture and

UNITED STATES INTERNATIONAL DEVELOPMENT COOPERATION AGENCY
AGENCY FOR INTERNATIONAL DEVELOPMENT
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Human Resources, Department of Agronomy and Soil Science.
1979, 248 p.

Farmers inoculate legumes with *Rhizobium* because they expect to obtain high crop yields less expensively than by applying nitrogenous fertilizers. In the developing countries of Latin America, Asia, and Africa, however, little awareness exists of the usefulness of biologically furnished nitrogen for crop plants. Because there has been little financial support for nitrogen fixation involving rhizobia legume symbiosis, only a few studies with tropical legumes have conformed to criteria considered essential for a definitive inoculation trial. In addition, scientists recognize that individual trials would be more meaningful if coordinated in an international network. Therefore, an international planning workshop, attended by 29 agricultural and social scientists, researchers, administrators, and management experts, was conducted by the Nitrogen Fixation in Tropical Agricultural Legumes (NIFTAL) Project managers with the dual purpose of producing: (1) a design for an experimental program to define the value of inoculating tropical legumes with *Rhizobium*; and (2) a strategy to implement an international network of legume inoculation trials. The proceedings of that workshop are contained in this document. Included are the keynote and introductory addresses and short reports on biological nitrogen fixation research in the tropics which constituted the material of the two plenary sessions; summaries of the six working sessions and the two task group meetings; and the resolutions of the final review session. Topics of the working sessions included strengths and constraints of research programs in developing countries; institutional networking; facilitating communication, coordination, and evaluation; expectations for the network experimental program; procedures for the network experiments; and strengthening rhizobiology through networks, conferences, and training courses. The workshop participants succeeded in attaining the workshop's two above-noted objectives and declared unanimous support for the NIFTAL Project. Appended to this document are the workshop program, list of participants, and experimental procedures for testing *Rhizobium* strains.

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Paper copy $32.24 Microfiche $ 3.24

034 PN-AAH-147

STATE OF THE ART: "ACACIA ALBIDA" AS A COMPLEMENTARY PERMANENT INTERCROP WITH ANNUAL CROPS

Felker, P.
University of California at Riverside, Department of Soil and Environmental Sciences.
1978, 143 p.

Acacia albida, a leguminous tree, has substantially increased the well-being of small farmers in the Sahelian desert region of West Africa by increasing soil fertility and crop yields and by providing pods for animal food. Although the available literature does not allow a completely accurate analysis of its actual and potential capabilities, it is reported that use of *A. albida* for foliage cover in intercropped systems on infertile soils has nearly doubled yields of millet and peanuts. Such use also reportedly increases the soil's organic matter and nitrogen content, soil microbiological activity, and water holding capacity beneath the trees. It has also been suggested, though not proven, that *A. albida* has increased the capacity of the land to support people from about 10–20 to 25–40 persons per square kilometer. By making unnecessary the continual process of letting mineral-depleted land lie fallow and clearing new land, *A. albida* is also credited with making possible permanent agricultural settlements. These are the major findings of the state-of-the-art review of the *A. albida* literature presented in this document. The text begins with the extensive literature review itself and then summarizes the effects of *A. albida* on crop yield and soil properties, the causes for *A. albida*-induced soil fertility, its pod yields and food values, and its growth cycle characteristics. The paper concludes with a discussion of ten areas in which, in the opinion of the author, research is urgently needed, either to anticipate and solve *A. albida* problems before they arise in the field, or to develop better agricultural practices and *A. albida* cultivars. Two appendices containing interviews with Senegalese farmers and with researchers in Paris and in Senegal concerning *A. albida* are also included. A foreward describes the method in which the documents (copies of which are now all deposited at the University of California, Riverside Library) contained in this literature review were obtained.

AID/afr-C-1361 625092600

Paper copy $18.59 Microfiche $ 2.16

035 PN-AAH-216

SWEET POTATO "IPOMOEA BATATAS L."; ABSTRACTS OF SELECTED RESEARCH AND DEVELOPMENT LITERATURE, 1949-1979

Ibekwe, G.O.
International Institute of Tropical Agriculture, Library and Documentation Centre.
1979, 268 p.

Information Series No. 6

World production of over 138 million metric tons from 14 million hectares and its use as a food crop in many tropical countries attest to the importance of sweet potatoes as a world crop. The International Institute of Tropical Agriculture has compiled the present volume of abstracts of publications on the sweet potato from selected research and development literature. The referenced publications cover the period 1949-1979 and are of interest primarily to scientists, agriculturalists, policymakers, extension workers, farmers, storage and processing experts, and nutritionists. The volume is arranged in the following sections: geographical distribution; research priorities and pro-

grams; genetics; breeding; production physiology; culture; pests, diseases, and their control; curing, chilling, and storage; food processing; and chemical composition and nutritive values. The sections on breeding, disease and pest control, food processing, and chemical composition and nutritional value are subdivided. Most of the referenced publications are in English. Documents in Japanese lacking an English summary were excluded. Detailed author and subject indices are appended.

AID/DSAN-G-0078 931030900

Paper copy $34.84 Microfiche $ 3.24

036 PN-AAH-370

NITROGEN FIXATION BY LEGUMES IN THE TROPICS

Bouldin, D.R.; Mughogho, S.; Lathwell, D.J.; Scott, T.W.
Cornell University, Department of Agronomy.
1979, 41 p.

Cornell International Agriculture Mimeograph No. 75

Spiraling costs and the impracticality of transporting nitrogen fertilizers in developing countries have encouraged increased research on the capacity of legumes to build and conserve soil fertility. This paper summarizes the estimated amounts of nitrogen fixed by legumes and the conditions which maximize the symbiosis of *Rhizobium* bacteria with legume host plants to fix nitrogen from the atmosphere and provide nitrogen for succeeding non-legume crops in the tropics. The *Rhizobium*-legume symbiosis contributes 40 million tons of nitrogen annually to grain legumes and thus offers great opportunities for increasing inputs of nitrogen in food production. Although nitrogen fixation in the tropics with tropical legumes is comparable in quantity to that obtained in temperate regions with temperate legumes, the deliberate use of tropical legumes for nitrogen fixation is not extensive. Legumes may be intercropped with non-legumes or grown in rotation whereupon legume residues furnish organic nitrogen to the succeeding non-legume crop. The economic value of the organic nitrogen to succeeding non-legumes rests on its amount and on the rate of its mineralization. The authors present tables on the net annual accretion of nitrogen in the soil-plant system by several legumes and discuss the contributions to nitrogen fixation of green manures and legume fallows, pasture/forage legumes, and grain legumes. Increased use of the latter should be encouraged as they appreciably increase the nitrogen available to succeeding non-legumes while protecting the soil from erosion. Grain legumes are an essential source of dietary protein in tropical regions, and larger protein yields can be obtained through polycropping with a non-legume grain, provided the proper *Rhizobium* is present. Three conditions are essential for optimum symbiotic nitrogen fixation: (1) compatibility between the *Rhizobium* strain and the host plant; (2) soil and environmental conditions which favor *Rhizobium* survival; and (3) increasing yield of the host plant as an essential condition for high symbiotic fixation. An 86-item list of references (1921–76) is appended.

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Paper copy $ 5.33 Microfiche $ 1.08

037 PN-AAH-600

A RAPID METHOD OF HAND CROSSING COWPEAS

Rachie, K.O.; Rawal, K.; Franckowiak, J.D.
International Institute of Tropical Agriculture. (IITA)
1978, 6 p.

Technical Bulletin No. 2

Cowpeas are generally easier to cross than other grain legumes. Their flowers are large and easy to manipulate, the keel is straight, beaked, and not twisted. There are only a few floral nodes per raceme, which tend to have a low abortion rate, and 8–12 seeds are usually produced per cross. This report presents an effective and rapid method of hand emasculating and crossing cowpeas which was developed at the International Institute of Tropical Agriculture (IITA). The normal crossing technique consists of removing the upper half of the petals starting with a partial cut opposite the stylar and staminal section. Following pollination with a freshly opened flower, the crossed bud remains uncovered. Normally, the emasculation-/pollination process can be accomplished at the rate of 1–2 per minute with a success rate of only 10–20%. The IITA technique, however, increases the rate of success to 50%, with attempts on male sterile plants (ms_2 ms_2), which require no emasculation, attaining a 70–80% success rate on the average. The IITA technique is performed in a greenhouse or mesh house which effectively eliminates major pests and important diseases and nematodes and facilitates watering, staking, and applying of nutrients. Since *Vigna* germplasm is day-length sensitive, flowering can be synchronized so that emasculation can occur the evening before the flower buds open. The bud for emasculation is grasped firmly but gently and a cut is made about two-thirds the width of the unopened bud in its center starting from its straight edge. The upper portion of the folded petals is then lifted out by the thumb and index finger and torn free, facilitating removal of the anther sacs with a scissors or forceps. Pollination can begin the next morning. Another technique involves removal of the mass of pollen grains from the hairy-necked style with a thumb nail, but great care is needed to prevent damage to the stigma and to avoid contamination. The success of the cross can usually be determined within 3 days of anthesis since the unfertilized ovary can remain attached for 2 days after anthesis. Moderate temperature and humidity will help enhance the success of the procedure. Pods are ready to harvest 18–22 days after pollination.

AID/ta-G-1491 931030900

Paper copy $ 0.78 Microfiche $ 1.08

038 **PN-AAJ-327**

GENETIC IMPROVEMENT OF PRODUCTIVITY AND NUTRITIONAL QUALITY OF WHEAT: FINAL REPORT OF RESEARCH FINDINGS

University of Nebraska, College of Agriculture.
1980, 112 p.

Food to nourish the world's population, which will reach 6.5 billion by the year 2000, transcends all other problems confronting countries and governments. To help increase world food production, A.I.D. funded a research project to genetically engineer high protein wheat (HPW) at the University of Nebraska from 1966 to 1979. This final report summarizes the project's research findings. Analyses of 20,000 wheat cultivars showed that genetic variation for HPW of at least 5% exists in hexaploid wheat; genetic variation for lysine (LYS) amounts to only 0.5%; LYS, as a percent of HPW, correlates negatively with HPW at protein levels up to 15%; and a strong positive correlation exists between LYS per unit weight and grain protein content. Major genes affecting grain HPW content were identified in Atlas 66 and Nap Hal. Genes modestly affecting LYS were found in CI13449 and Nap Hal. Hybridized genes were transferred to productive short-statured winter and spring wheats. High-yield varieties developed included Lancota (a hard winter variety), Sava and Partizanka (Yugoslavia), Kavkaz and Aurora (the Soviet Union), and Centurk (Nebraska). Genetic studies indicate that Atlas 66 carries two or more major genes for HPW. Genetic increases in LYS provided by CI13449 and Nap Hal, while limited, are great enough for use in breeding programs and for overcoming the decrease in the fractional percent of LYS in HPW due to HPW's overall increase. Laboratory procedures were developed to streamline the large-scale screening of HPW and LYS samples. Tests showed that Atlas 66 and its HPW derivatives, when consumed whole-grain, are significantly more nutritional than ordinary wheat. Significant associative nitrogen fixation could not be shown for Nebraska wheat. Other project activities included establishment of an international winter wheat evaluation network; the holding of four international wheat conferences and an international workshop on seed HPW; and the provision of degree and nondegree training to 29 researchers, 14 of them from developing countries. The report concludes by noting that, since yields will soon regress without ongoing breeding programs, A.I.D.'s decision to cease funding the project is regrettable.

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Paper copy $14.56 Microfiche $ 2.16

039 **PN-AAJ-378**

BLUE-GREEN ALGAE AND RICE

Roger, P.A.; Kulasooriya, S.A.
International Rice Research Institute (IRRI).
1980, 118 p.

Rising costs of the chemical fertilizers used to provide the combined nitrogen needed for rice production have prompted rice researchers to turn their attention to biological nitrogen sources such as blue-green algae (BGA). Although BGA produced nitrogen when inoculated into paddy rice crops in India, uncertainties about the ecology of BGA and their mode of action on the rice plant limit their practical use. To orient agronomic research on this subject, this report presents a compilation of the relevant international research on the ecological, physiological, and agronomic aspects of BGA in flooded rice paddies. A section on descriptive ecology covers BGA occurrence in paddy fields, description of its several species, quantitative estimation studies, and accounts of its growth patterns relative to the cycles of rice cultivation. Sections on soil properties and on physical and biotic factors describe the effects on BGA of light, temperature, desiccation and rewetting, pathogenic organisms, and soil pH. A section on agronomic practices treats the effects on BGA of land preparation and management, inorganic and organic fertilizers, and pesticides. A section on the physiology of BGA in rice fields includes information on photosynthesis and nitrogen fixation. The next section, on BGA and the rice plant, covers the availability of fixed nitrogen for rice, other positive and negative effects of BGA on rice, and epiphytism. Sections on algalization describe BGA's effect on crop yield and on soil properties and microflora and its significance in the selection of rice strains for breeding, as well as the factors limiting algalization and current algalization technology (inoculation) and economics. A concluding chapter details specific questions in the two key areas on which future research should be focused—the ecology of BGA in rice fields and their modes of action on the plant, and the ways in which BGA favor rice growth. A 369-item list of references (1924–80) cited in Arabic, Chinese, English, French, Italian, Japanese, Korean, Portuguese, Spanish, and Russian, is appended.

AID-492-1310-T 497019800

Paper copy $15.34 Microfiche $ 2.16

040 **PN-AAJ-414**

INNOVATIVE APPROACHES TO RICE BREEDING: SELECTED PAPERS FROM THE 1979 INTERNATIONAL RICE RESEARCH CONFERENCE

International Rice Research Institute.
1980, 187 p.

The wide range of ecological conditions under which rice grows around the world is evidence of the equally wide genetic variability found among cultivars of this crucial food crop. A primary objective of today's rice breeders is to use this variability to develop high yielding, resistant varieties which can tolerate adverse environmental conditions. However, to provide significant advances quickly will require development of new breeding techniques. This report, therefore, offers innovative rice breeding techniques as presented by Swedish, American,

Chinese, Japanese, Austrian, Russian, and Indian rice geneticists at the 1979 International Rice Research Conference. The report's 10 papers outline global efforts to develop new varieties by means of such specialized breeding techniques as hybrid breeding, distant hybridization, modified bulk population methods, and mutation breeding, as well as by means of faster-working methods such as protoplast, cell, and tissue culture techniques. It is hoped that these newer and faster techniques will result in the timely development of cultivars adapted to such adverse conditions as low temperature, saline soil, and drought. Most of the conference papers in the report are accompanied by supporting data, tables, charts, diagrams, and pictures; and all are thoroughly referenced, including citation of selected French, German, and Japanese titles.

AID/492-1310-T 497019800

Paper copy $24.31 Microfiche $ 2.16

041 PN-AAJ-497

IMPROVEMENT OF NATIVE RICES THROUGH INDUCED MUTATION

Mahadevappa, M.; Ikehashi, H.; Noorasyamsi, H.; Coffman, W.R.
International Rice Research Institute (IRRI).
1981, 7 p.

IRRI Paper Series No. 57

In large areas of the rice-growing world, adverse soil and other conditions limit rice yields and prevent nations from fully exploiting their productive capacities. Mutagenesis, or induced mutation, has proven to be an effective tool for improving the height, maturity, and grain characteristics of cultivars growing under adverse conditions. This report outlines the results of an experiment, conducted by the International Rice Research Institute, in which mutagenesis was used to induce cultivars from the tidal swamps of South Kalimantan, Indonesia to be early-maturing and short-statured without losing their tolerance of tidal swamp conditions. Dry seeds of eight cultivars were treated with ethyleneimine at 0.2% and 0.4% concentrations for 1 and 3 hours to induce mutation. The positive correlation between germination of M1 seeds and spikelet fertility was used to identify optimal treatments for future experiments. Single panicles selected from M1 plants from two effective treatments (0.2%, 3 hours; and 0.4%, 3 hours) produced 1,844 M2 progenies for further screening. Screening of the M2's in natural long day length in the 1979 dry season facilitated selection of photoperiod-insensitive types from Siyam Halus mutations (IR29386) and of intermediate-statured but photoperiod-sensitive mutants from Siyam Kuning (IR30446). Early-maturing mutants, grown in the wet season as M3 plant progenies, bred true for earliness—even with short day length they matured about 1 month earlier than the parents. Intermediate-statured plants were about 35 cm shorter but otherwise the same as their parents. Tillering was improved; spikelet number per panicle was slightly reduced. Initial evaluation in the tidal swamps indicated that the mutants were well adapted but matured later than Siyam Kuning. Further investigation using several planting dates is planned in 1981. The report concludes that if ethyleneimine is specific in altering culm length it should be emphasized as a future tool for improving specifically adapted traditional rice varieties. A 19-item bibliography (1952–80) is appended.

AID/492-1310 497019800

Paper copy $ 0.91 Microfiche $ 1.08

042 PN-AAH-199

SOIL RESOURCE INVENTORIES AND DEVELOPMENT PLANNING; PROCEEDINGS OF A WORKSHOP

Cornell University, Department of Agronomy.
1978, 340 p.

Soil Resource Inventories (SRI) are maps that accurately record the geographic distribution of soil bodies and identify soil conditions for given land use objectives. This document contains the proceedings of the 1978 workshop sponsored by the SRI study group at Cornell University. In seven sessions, the workshop examined the methodologies used to effectively plan, present, and evaluate SRI information. After an introduction on the aims and rationale of the Cornell group's study of SRI's, section one of the proceedings reviews the 1977 SRI workshop and provides an introduction to guidelines used in the appraisal of SRI's. Section two discusses the objectives of SRI's in development planning and includes a standardized map checklist used to record soil and map data from which SRI's are compiled. Section three outlines the use of simplified response curves to illustrate the cost/benefit relationships of SRI's and reports on an evaluation of rice lands in Sri Lanka. Sections four and five, which treat the appropriate interpretation and clear presentation of SRI data to meet the individual needs of development planners, include reports on the use of SRI's by ORSTOM (Office de la Recherche Scientifique et Technique Outre-Mer), the World Bank, and the Comprehensive Resource Inventory and Evaluation System (CRIES) in the Caribbean, along with reports on the use of SRI's in Thailand, Peru, and India in regional and national development planning. Section six discusses quality control in the gathering, analysis, and presentation of soil survey data and the responsiveness of soil survey organizations to government legislation. Recommendations on the use of SRI's by development planners, the subject of section seven, include developing a comprehensive soil classification system in the lower categories for each subcontinent and developing international technology transfer training programs to assist individual countries to better inventory their resources and to create or improve their information systems on land use and natural resources. Appended are a list of workshop participants and summaries of workshop discussions, including a special summary of discussions on the use of SRI's for paddy rice.

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043 **PN-AAH-138**

A SELECTIVE ANNOTATED BIBLIOGRAPHY OF RURAL POVERTY IN COLOMBIA

Thirsk, W.R.
A.I.D., Bureau for Latin America and the Caribbean, Rural Development Division; University of Waterloo.
1977, 15 p.

A.I.D. Working Document Series: Colombia, General Working Document No. 1

Since 1950, rural poverty in Colombia has drawn an increasing amount of scholarly attention. This 56-item bibliography (1951–78) of selected English and Spanish language titles is thought to be the most comprehensive attempt yet made on the subject. Document types include censuses, surveys, and other primary data sources which describe much of the analytical work that has been done on Colombia. Major topics of discussion include employment and income distribution; the relation of education to rural development; rural tax policy; characteristics and decisionmaking processes of small farmers; land tenure, reform, and redistribution; crop and livestock production; and characteristics of rural-to-urban migrants. Each entry is followed by a brief annotation indicating the entry's contents.

Paper copy $ 1.95 Microfiche $ 1.08

044 **PN-AAH-847**

RAPID RECONNAISSANCE APPROACHES TO ORGANIZATIONAL ANALYSIS FOR DEVELOPMENT ADMINISTRATION

Honadle, G.
Development Alternatives, Inc.
1979, 62 p.

Strong political and organizational pressures often require administrators to make decisions based on information that has not been collected and analyzed according to the rigorous methods recommended by social scientists. To help administrators in this situation from employing information that is not only less than optimal but actually inaccurate, this paper suggests ways to improve quick, impressionistic data collection methods. When employing rapid reconnaissance methods, social scientists discard the usual questionnaire and subsequent quantitative analysis. Instead, reconnaissance practitioners use proxies for complex dynamics and perform spot checks of the proxies. This technique was used to measure the success of a campaign against illegal lumbering in an Asian country. Typical indicators (reported encounters, arrest rates, conviction rates, and confiscated lumber) were discarded as unreliable. The researcher chose instead to monitor the price of elephants—the assumption being that since the major use of elephants was in lumbering, their going rate in the local market would reveal the campaign's effectiveness. Advantages of these strategies include timeliness, low cost, and flexibility. Major disadvantages are the difficulty of judging either the accuracy of the data or the investigator's performance (due to the lack of standardization). Also, simple proxies can be misleading. For example, it would seem that a spit-and-polish department of agriculture packed with highly paid Ph.D.'s would be a good indicator of an organization's effectiveness. However, this assumption does not consider the typical unwillingness of highly qualified personnel to travel to rural areas and train farmers. Thus, it is important to articulate and test one's assumptions. The author recommends that studies be made to determine the contingencies that tend to invalidate different types of indicators. Also, social scientists should study trade-offs between reconnaissance approaches and indepth methods and try different combinations. The author emphasizes that reconnaissance methods are not a panacea for budget constraints or deadlines, but sometimes provide a practical alternative to costly orthodox approaches.

AID/DSAN-C-0065 936530000

Paper copy $ 8.06 Microfiche $ 1.08

045 **PN-AAH-938**

APPROPRIATE TECHNOLOGY FOR DEVELOPMENT: A DISCUSSION AND CASE HISTORIES

Evans, D.D.; Adler, L.N.
Denver Research Institute.
1979, 508 p.

Westview Special Studies in Social, Political, and Economic Development

The failure of development assistance efforts to lessen poverty, especially for the 800 million, mostly rural people living below the minimum subsistence level, forces consideration of the ability of the technologies used in these efforts to achieve economic development. This book explores recent thought on this question and illustrates the economic effect of technology with 22 case histories drawn from all over the world. Technology is the means used by human beings to change their environment. The term "appropriate technology" (AT) is used when culturally congenial, least-cost, labor-intensive means are used to meet essential development goals. After summarizing the principal issues involved in AT—environmental limitations, population growth, the inequitable distribution of wealth, and the often negative role played by technology in the past—the study addresses the advantages and disadvantages of different development theories and imported technologies. The study defends the humanistic/conservator ethic personified by E.F. Schumacher (*Small is Beautiful*) who contends that our age's rampant materialism uses technology to perpetuate a cycle of ever-increasing wants and not to meet the world's modest absolute material needs. Gearing AT away from maximizing consumption to long-term productivity gains is difficult, however, and research on a given country's environment, development goals, and technology is needed. The following

criteria should be considered in choosing between technological variables: (1) recognition of a problem in the project area; (2) public attitudes; (3) domestic social and economic structures; (4) possibility of adapting imported technology; (5) the volume of replication and market conditions; (6) availability of materiel and other resources; and (7) government policy. After analysing AT's growing importance in U.S. development assistance efforts, the 22 case studies are examined in terms of their human and material resources, the means used to develop these resources, and the environmental effect of this use. Examples of AT provided range from converting automotive fuel from gas to butagaz to developing lime kilns. A 144-item bibliography (1972–79) is attached.

AID/DSAN-C-0062

Paper copy $66.04 Microfiche $ 6.48

046 **PN-AAJ-319**

REGIONAL PLANNING FOR INTEGRATED DEVELOPMENT IN THE DOMINICAN REPUBLIC

University of Wisconsin, Regional Planning and Area Development Project.
1981, 36 p.

Consulting Report No. 5

Development initiatives in areas where poverty is absolute and infrastructure virtually non-existent require careful planning efforts. In this study, the University of Wisconsin, in response to a request from the Oficina Nacional de Planificacion (ONAPLAN), analyzes in-country USAID/Dominican Republic and ONAPLAN possibilities for a Regional Planning and Area Development Project (RPADP) in the Dominican Republic with specific reference to the country's southwestern and southcentral areas. The team notes that an integrated strategy for area development requires a multisectoral approach in a specific geographical area where the government is committed to decentralization, i.e., to creating and maintaining an institutional infrastructure invested with decisionmaking authority. To date, despite the Dominican Republic's commitment of administrative and financial resources to regional programs, decentralization efforts have often been disorganized and diffused. Within this context, the prospects for developing agriculture, agroindustry, manufacturing, and marketing are reviewed in terms of physical and institutional resources. The Southwest possesses a sufficiency of both types of resources to offer genuine development potential in agriculture and industry and could serve as a model for decentralization efforts elsewhere. Improved irrigation, a research facility, and increased agricultural inputs could strengthen cotton, castor beans, grapes, and grain sorghum production; while manufacturing possibilities exist in export assembly operations and food processing. By contrast, the Southcentral region is still recuperating from the damage inflicted by Hurricanes David and Frederick in 1979 and lacks sound institutional infrastructure. Consequently, long-term development efforts should be deferred in this area until immediate needs are met. It is recommended that USAID link RPADP to efforts of the Instituto para el Desarrollo del Suroeste (INDESUR); coordinate technical assistance in specific sectors under the umbrella of an RPADP program; and engage in institution-building efforts to increase the capacity of ONAPLAN and other Dominican agencies to engage in regional planning, development, and decentralization.

AID/DSAN-C-0060 931113500

Paper copy $ 4.68 Microfiche $ 1.08

047 **PN-AAJ-467**

INTEGRATED RURAL DEVELOPMENT: MAKING IT WORK?

Honadle, G.; Morss, E.R.; VanSant, J.; Gow, D.D.
Development Alternatives, Inc.
1980, 266 p.

Executive Summary Published Separately: PN-AAJ-468, 45 p.

As part of an A.I.D. project to assist managers of integrated rural development (IRD) projects, in which success depends as much on effectively mobilizing complex resources as on technical expertise, this report, based on a 2-year experience in 10 developing countries, presents the state-of-the-art in IRD project management. Around the two key factors of organizational design and managerial tactics, the report details a wide range of perennial problems and choices faced by IRD project managers in delivering goods and services, eliciting local response, and effecting self-sustaining improvements. The resulting practical guide, in which the need for choices involving trade-offs is continually noted, stresses the following elements as essential: For the delivery of goods and services, effective organizational design requires choosing an appropriate level of centralization or decentralization and a capable host agency and in establishing a clear and coordinated chain of command. Managers, who should possess management skills prior to the project's inception, need to base decisions in these areas—particularly regarding technical assistance strategies—on sound data and know-how to exercise authority in informal, collegial, and motivative ways. To elicit local response to development initiatives, a sound organizational design should incorporate the use of local organizations to include villagers in the decisionmaking processes, while managers should use flexible strategies in coordination with local leaders. The persistence of unforeseen negative side effects of IRD efforts and lack of a clear concept of welfare itself make measuring self-sustaining welfare highly uncertain. Such welfare seems best attainable in projects which are small-scale and deal with critical constraints; require local resource commitments and build local organizational and management capabilities; share implementation responsibilities between villagers and project staff; and create and use a management information system. A 518-item bibliography in English, French, and Spanish (1955–80) is included.

AID/DSAN-C-0065 936530000

Also available as "A Preliminary Review of the State-of-the-Art" in French: PN-AAJ-470, 66 p.; and in Spanish: PN-AAJ-469, 63 p.

Paper copy $34.58 Microfiche $ 3.24

048 PN-AAJ-518

DECENTRALIZATION FOR DEVELOPMENT: THE FORM AND SUBSTANCE OF INTERNATIONAL DEVELOPMENT STRATEGIES

Morgan, T.E.
Wisconsin University, Regional Planning and Area Development Project.
1981, 51 p.

Occasional Paper No. 3

Dispelling the ambiguities surrounding the current theory and practice of decentralization, widely touted as the key to development strategy, this study develops a clearer and more appropriate view of decentralization. The author first argues that decentralization is inherently limited both because it presupposes a stabilized environment (the alternative would be anarchy) and because of unavoidable conflicts of interest between the main types of governmental field administration—by geographical prefecture and by development sector. The author then notes that, in general, organizations move towards greater or lesser degrees of decentralization either for organizational reasons (the organization's "environment", available technology, and goals) or because they are spurred on by movements for social and behavioral reform. In the author's view, most development strategies calling for political or administrative decentralization derive from the latter causes: decentralization and its corollary, popular participation, are deemed necessary to reverse the rigid social and governmental structures that exploit the poor. Actually, however, the substance of these strategies belies their rhetoric; for in practice they deny local entities real power and promote participation to reinforce rather than to reform existing central power structures. In the author's view, this is because these "decentralization" strategies are ultimately aimed at satisfying the basic needs of the poor and in effecting a more equitable distribution of wealth—a process impossible without a centralized power. Despite their contention that Third World development is an endogenous process unrelated to Western models, all such strategies have arisen in the West and reflect Western philosophy and Western experiences of industrialization and mass society. The author concludes by proposing a more modest approach in which decentralization in selected areas is coupled with structured participation. He advocates a turning from the social and behavioral reform viewpoint which, confusing means with ends, provides little guidance, towards the more sober and flexible viewpoint of organizational theory. A 92-item bibliography (1945–79) is appended.

AID/DSAN-C-0060

Paper copy $ 6.63 Microfiche $ 1.08

049 PN-AAJ-523

ASSUMPTIONS UNDERLYING THE REGIONAL PLANNING AND AREA DEVELOPMENT PROJECT—A CRITICAL APPRAISAL

Nair, K.
Wisconsin University, Regional Planning and Area Development Project.
1981, 46 p.

Occasional Paper No. 2

How valid are the assumptions underlying the regional planning and area development (RPAD) approach to the U.S. bilateral development assistance program? Using several RPAD projects as examples, this issues paper argues that these programs often fail to reach their targeted beneficiaries because of unrealistic basic assumptions. For example, the poor are identified statistically according to degree or rate of caloric intake, infant mortality, access to broadly defined health services, and per capita income, but human factors such as needs, aspirations, caste, and creed are ignored. The poor are assumed to be concentrated in areas of arid or otherwise vulnerable ecosystems when many are, in fact, often found in fertile areas and in urban centers. Administrative decentralization is supposed automatically to ensure participation by the poor in the planning and decisionmaking process, but no account is taken of the critically important areas of physical infrastructure, social systems, financial resources, availability of trained personnel, or the nature of the political process among the target group. The author attributes these faulty assumptions to two sources: frequent changes in foreign aid policy and focus made in deference to domestic and international politics; and the reluctance of universities competing for A.I.D. projects and funds to question program assumptions, along with the failure of these universities to study the complex socioeconomic problems of developing countries. To make regional planning more effective, the author recommends: macro studies realistically accessing the potential for achieving participation of the poor and outlining minimum policy and structural reforms and amounts of foreign aid necessary to ensure project success; rigorous, independent analysis of underlying concepts and premises prior to program adoption; ongoing evaluation of assumptions in the course of project implementation; and greater emphasis at the universities on intra- and inter-disciplinary teaching and research in the theory, methodology, and problems of development. A 32-item bibliography (1967–80) is appended.

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Paper copy $ 5.98 Microfiche $ 1.08

050 **PN-AAJ-632**

PEASANTS, OFFICIALS AND PARTICIPATION IN RURAL TANZANIA: EXPERIENCE WITH VILLAGIZATION AND DECENTRALIZATION

Formann, L.
Cornell University, Center for International Studies, Rural Development Committee.
1980, 162 p.

Special Series on Rural Local Organization, RLO No. 1

Tanzania has failed to realize its goals of participatory socialism and collective agricultural production. The fault lies with the definition and implementation of these policies by a central government bureaucracy structurally and attitudinally similar to its colonial antecedents. This report examines Tanzania's colonial and post-independence bureaucracies in relation to the two conflicting driving forces of rural development: the need for genuine local decisionmaking to ensure a commitment to development programs and the need for central control to allocate scarce resources in a coherent nation-building strategy. The degradation of local government begun under German and British rule has continued into the present, with the peasantry excluded from all decisionmaking and subjected to programs encouraging only passivity and surplus production—to the bureaucracy's benefit. Efforts to ensure government accountability, such as decentralizing the bureaucracy, have had no impact. The peasantry has no voice in the development process, as the government ignores village councils and leaders and allows no debate on its policies. Peasant participation is thus gained through largesse or coercion, with the latter exemplified under Operation Vijiji, where the government forcibly relocated 11 million people to nucleated settlements. The peasantry can only bargain with officials; actively or passively resist unpopular policies; initiate local projects, forcing the government to finish them; or petition individual government leaders. The negative impact of this situation upon self-help projects and the ujamaa village program (which emphasizes communal agricultural production) has been substantial. Self-help project participation has fallen sharply, increasing project costs, and the ambitious ujamaa program has not worked, as the non-participatory cycle nurtured self-fulfilling prophecies of failure. The bureaucracy's recent emphasis upon surplus production over the ujamaa program's socialist aims and its reactivation of the hated colonial by-laws mandating development participation suggest that the aspirations which sustained Tanzania's drive for independence have yet to be realized.

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Paper copy $21.06 Microfiche $ 2.16

051 **PN-AAJ-634**

ANIMATION RURALE AND RURAL DEVELOPMENT: THE EXPERIENCE OF SENEGAL

Gellar, S.; Charlick, R.B.; Jones, Y.
Cornell University, Center for International Studies, Rural Development Committee.
1980, 221 p.

Special Series on Animation Rurale No. 2

After 20 years (1959–79), the theory of "Animation Rurale" (AR), which emphasizes cooperative village control of economic institutions, has been discarded as a basis for rural development planning in Senegal. To explain this abandonment, this study traces, in the light of Senegal's rural development context and AR theory/methodology, the history of AR in Senegal, the AR techniques used, and AR's use in specific regions. The study concludes that AR, being based on an egalitarian/communitarian view of society, was theoretically unsuitable for use in Senegal, which has a patriarchical/hierarchical rural society structure and a central government with a limited will to create popularly controlled institutions. AR implementation also was impeded by the lack of widespread local discontent presupposed in AR theory; the antagonism of entrenched party and bureaucratic interests; and the small size of the AR agency (100 people). Yet, AR did enlist popular participation to implement government programs, involve people in cooperatives, and organize village women in service/behavioral activities, e.g., day care centers and nutrition programs. In general, AR succeeded best where contextual and organizational factors were favorable. The use of AR has taught that: (1) AR will fail when a government cannot or will not alter local power infrastructures or when it subordinates political reform to economic growth; (2) the government is more likely to use AR to induce local involvement in government projects than to promote social reform; and (3) most importantly, there is a need to integrate AR into an overall policy and implementational framework. Finally, the use of AR in Senegal should be judged in comparison to other approaches, such as that of the Maisons Familiales Rurales (MFR) program, and not in light of the utopian, socialist goals of AR theory. While basically similar to AR in philosophy and methodology, MFR differs in that well-educated, paid technicians operate locally under close professional/state supervision to form and nurture village organizations and to develop youth training programs in such practical areas as carpentry. In fact, the MFR style may be the successful AR approach during the coming decade.

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Paper copy $28.73 Microfiche $ 3.24

052 **PN-AAJ-635**

PARAPROFESSIONALS IN VILLAGE-LEVEL DEVELOPMENT IN SRI LANKA: THE SARVODAYA SHRAMADANA MOVEMENT

Moore, C.
Cornell University, Center for International Studies, Rural Development Committee.
1981, 73 p.

Special Series on Paraprofessionals, No. 4

Despite increasing worldwide interest in the use of paraprofessionals as frontline workers to provide services to the rural poor, knowledge needed to plan and conduct paraprofessional programs remains scant. To remedy this lack, model programs in six countries were studied. This report, the fourth of the series, details Sri Lanka's Sarvodaya Shramadana Movement (SSM), a private voluntary organization that began in 1958 and has since gained national status (involving 2,500 villages) and international acclaim for its holistic development approach. In SSM, development starts at the village level with 3–6 day initiation camps in which village volunteers, directed by SSM district leaders, work to meet some felt need such as building a village access road. Afterwards, with enthusiasm high, village groups are formed, SSM workers (considered paraprofessionals) are selected, and programs such as preschool/day care, health, and community development are begun. Several variables affect worker performance: (1) Since workers are often selected by local village or SSM authorities with the village simply concurring, they may not be perceived as community representatives. (2) SSM workers are adequately trained to perform basic services but lack skills for more complicated or long-term projects. (3) District workers often lack the materials, money, time, and/or skills to adequately support and supervise inexperienced SSM workers. (4) SSM stipends cannot compete with regular job earnings, but other factors, including gaining recognition and increasing job skills, often motivate villagers to join. On the whole, SSM's success in attracting wide support among rural populations has been limited by two ongoing problems: the very poor remain largely uninvolved and villagers tend to lose their initial level of interest. Recommendations include: improve training so workers can better design and implement projects; upgrade the quality of district/regional workers who supervise and train local workers; and create more leadership roles to allow for greater specialization and to lessen burdens. Appendices include a village health survey form and training course outlines.

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Paper Copy $ 9.49 Microfiche $ 1.08

053 PN-AAJ-637

PARAPROFESSIONALS IN RURAL DEVELOPMENT

Esman, M.J.; Colle, R.; Uphoff, N.; Taylor, E.; et al.
Cornell University, Center for International Studies, Rural Development Committee.
1980, 154 p.

Special Series on Paraprofessionals, No. 1

The reluctance of developing country professionals to work in remote rural areas and the prohibitive cost of delivering the social services so sorely needed there attests to the need for effective paraprofessionals (PP's) as agents of rural development. This report, based upon a study of PP programs in six nations, describes the role of PP's in rural development, as well as the factors which spell success or failure for development efforts employing such personnel. The PP is active mainly in health or agricultural roles and performs a wide variety of tasks, from delivering services or information to serving as community organizer. Sponsors of development programs, however, often undermine their efforts by wrongly assuming that volunteer or underpaid PP's will perform efficiently ad infinitum, with community support assured and without adequate supplies or inspection. Three factors are thus crucial to PP: (1) an adequate program design; (2) an appropriate support system; and (3) strong community participation. PP program design must base the PP's duties, selection, and compensation upon the targeted area's needs and social context. Moreover, PP tasks and accountability must be well defined. Insufficient supervision and support are usually the major flaws of PP programs. Adequate supervision ensures the PP's discipline, local prestige, continued training, and increased morale. Inadequate support in terms of supplies and equipment often separates programs that are only initially successful from those that are continually viable. To ensure the program's continuity, community participation must be included in it from beginning to end, especially regarding PP selection and support for and evaluation of the program. Donor agencies should promote PP activities in the areas cited above. Appended to the report are an assessment of PP agricultural roles; a 132-item bibliography (1902–80); and summaries of case studies in Bolivia, Guatemala, Senegal, Sri Lanka, Upper Volta, and the Philippines.

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Paper copy $20.02 Microfiche $ 2.16

054 PN-AAJ-642

LOCAL ORGANIZATION AND PARTICIPATION IN INTEGRATED RURAL DEVELOPMENT IN JAMAICA

Goldsmith, A.A.; Blustain, H.S.
Cornell University Center for International Studies, Rural Development Committee.
1980, 153 p.

Special Series on Rural Local Organization, No. 3

Local organizations (LO's) perform a critical role in agricultural development projects by facilitating communication among farmers, legitimizing a project in the eyes of local farmers, mobilizing farmers in support of project activities, and encouraging community self-reliance. Following a growth in agricultural production of only 0.7% per year from 1972–77, this report investigates the role of LO's in Jamaican agriculture in order to improve planning and implementation of the joint A.I.D.-Government of Jamaica Second Integrated Rural Development Project (IRD). The impoverished Two Meetings and Pindar River watersheds are emphasized, but because these areas epitomize Jamaican agriculture and because most of the LO's examined—the Jamaica Agricultural Society (JAS), commodity organizations, a cooperative bank, and civic groups—are national, the results apply to Jamaica as a whole. Non-agricultural LO's, primarily concerned with community and social well-

being, attracted few members unless commercial advantages were offered. Most agricultural LO's had very narrow responsibilities and major economic decisions were made by non-local administrators, but membership, primarily a function of the type of crops grown, was higher and was used to gain access to crop marketing channels. The report concludes that Jamaican farmers will need to be more fully engaged in LO's to facilitate cooperation and the future spread of new technologies. It is therefore recommended that: (1) established LO's, particularly the JAS, be encouraged to take on new functions and embark on more vigorous development work; (2) LO's provide tangible benefits (e.g., seed capital) to convince their membership of the importance of participation in project efforts; (3) LO's tailor their activities and benefits to meet varying farm and community needs in different localities; and (4) LO leaders and members be allowed meaningful input into project activities to prevent feelings of powerlessness and bureaucratic domination from discouraging support of rural development projects. The survey sample and methodology are appended.

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Paper copy $19.89 Microfiche $ 2.16

055 PN-AAJ-643

LOCAL INSTITUTIONS AND PEOPLE'S PARTICIPATION IN RURAL PUBLIC WORKS IN NEPAL

Pradhan, P.P.
Cornell University, Center for International Studies, Rural Development Committee.
1980, 107 p.

Special Series on Rural Local Organization, No. 4

Local participation through local institutions is the key to the future of rural development in Nepal. So concludes this study of the dynamics underlying three successful cases of local participation in public works projects in Nepal. Nepal's sociopolitical history is traced from its unification under the Saha kings in 1769 to the emergence in 1951 of a constitutional form of government under which local people were promised active participation in the country's development. Government efforts to make that promise a reality are detailed. Three rural public works projects undertaken jointly by the government and local people are then analyzed: construction of the Banglung suspension bridge and of the Illam-Charali trunk road, and efforts of the National Development Service to promote infrastructure development by mobilizing local labor and resources. Although implementation of all three projects differed on the organizational level, all made use of ad hoc committees besides those established by statute (local and district Panchayats), thus allowing a flexibility that encouraged local people to select locally suitable alternatives. Local ability to express local need also abetted the success of these projects, as was strikingly shown in the Illam-Charali road project, in which local leaders elicited and obtained support for the project from the King of Nepal himself. The three projects also showed that local participation is limited by local technological capability (the simpler the technology employed, the greater the participation), so that government introduction of a new technology into an area requires systematic preparation. The projects also showed, however, that participation increased with the degree of local technological expertise. Finally, all three projects used tremendous amounts of local materials and labor—all of it freely given, generally in accordance with local ability to make project decisions and the feeling that the resources would be used to match local needs. The vast need for infrastructure in Nepal and the country's current financial condition clearly show the importance of such extensive contributions. Appendices include a 35-item bibliography (1952–79).

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Paper copy $13.91 Microfiche $ 2.16

056 PN-AAJ-647

REACHING THE ASSETLESS RURAL POOR: PROJECTS AND STRATEGIES FOR THEIR SELF RELIANT DEVELOPMENT

Lassen, C.A.
Cornell University, Center for International Studies, Rural Development Committee.
1980, 72 p.

Special Series on Landlessness and Near-Landlessness, No. 6

The only assets the landless and near-landless (LNL) possess are their labor and their capacity for collective action. This report questions whether restricting the LNL's participation in development efforts to implementation and reception of benefits without allowing them to participate in the decisionmaking, management, and evaluation processes produces the structural changes needed for long-run, self-reliant development. Because developing country governments often extend only to the district level, lack concrete knowledge of the LNL's situation, and rely on intermediary institutions which favor local elites, the LNL must form themselves into clientele groups to effectively seek public goods and services. To spur this organizing process, catalyst agencies are needed to motivate, inform, and organize the LNL. Based on the case studies included in this report on selected programs to assist the LNL in Bangladesh, Bolivia, India, Guatemala, the Philippines, El Salvador, Haiti, Mexico, and Upper Volta, those techniques employed by catalysts which have been most successful are: (1) creating community consensus through nonformal adult education; (2) changing people's views of themselves and their social environment in order to motivate change; (3) building organizations for group action; and (4) generating employment and increasing income through labor-intensive activities. To assist catalyst agencies to expand their efforts in order to effectively meet the demands placed upon them, the report recommends that: (1) catalyst agencies increase the use of networking among themselves to overcome their shortage of technical skills; (2) major assistance agencies assign personnel to their field missions to

help small indigenous organizations make assistance proposals; (3) donors make grants available to build up the ability of indigenous consulting firms to conduct feasibility studies; (4) increased support be given to "super-networks" such as Private Agencies Collaborating Together (PACT) and Coordination in Development (CODEL); and (5) donor personnel be immersed into the totality of village life. Criteria for evaluating antipoverty projects are also included.

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Paper copy $ 9.36 Microfiche $ 1.08

057 **PN-AAJ-654**

COUNCILS FOR DEVELOPMENT; AN INTERNATIONAL DIRECTORY OF COUNCILS AND ASSOCIATIONS OF VOLUNTARY AGENCIES AND OTHER ORGANIZATIONS IN DEVELOPMENT ASSISTANCE

Technical Assistance Information Clearing House; International Agricultural Development Service.
1981, 76 p.

Worldwide development assistance programs are thriving, and their efforts are being amplified, focused, and enhanced through membership in councils. Councils, as defined in this directory, are international, national, or regional associations of voluntary or private organizations, each of which is involved in some aspect of assistance to developing countries and their people. A council's functions include: joining groups that share common concerns; advancing the members' operating capabilities, helping them avoid duplication of efforts; expediting consultation and information exchange among council members and between the council and governments; providing a forum through which groups can be collectively represented; and promoting some degree of collaboration, cooperation, and/or coordination among member organizations. This directory presents profiles of 18 councils, representing a total collective membership of more than 1,325 organizations involved in a wide range of activities including agriculture and food production; communications and publications; urban and rural community development; construction and housing; cooperatives and credit unions; development policy and development education; disaster relief and rehabilitation; education at all levels; family planning; industry and craft development and management; legal services; material aid; medicine and public health; nutrition; public administration; social welfare; social justice; vocational training and employment; water resource development; and women's programs. Each entry is listed alphabetically by common country name and details the council's name, address, origin, objectives, activities, relationship to government and other organizations, structure, funding, publications, sources, and member and associate membership lists. The names and addresses of 11 additional councils are also given. Appendices include a glossary of council name acronyms, a sample questionnaire for council profiles, and a directory response form.

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Paper copy $ 9.88 Microfiche $ 1.08

058 **PN-AAJ-699**

RURAL DEVELOPMENT IN BOTSWANA; A SELECT BIBLIOGRAPHY 1966-1980

Eicher, S.F.
African Bibliographic Center.
1981, 155 p.

Southern Africa Development Information/Documentation Exchange (SADEX)

A tool intended to assist researchers, teachers, government officials, and rural development personnel working in Botswana, this annotated, 1,280-item bibliography (1966–80, i.e., since independence), was prepared by the Southern Africa Development Information/Documentation Exchange (SADEX) project team in partial fulfillment of its purpose to provide a development information network for rural development in Southern Africa. Publications are grouped according to the following categories: general and reference; agriculture; development; education and training; employment, labor, and migration; geography, natural resources, and ecology; health and nutrition; housing; industry, commerce, and mining; land tenure and use; livestock; marketing, cooperatives, and credit; politics and government; society and culture; transport and communications; urbanization; and women in development. The source of each publication varies widely from individual authors to such institutions as U.S. and foreign universities and governmental departments and the International Bank for Reconstruction and Development. Major sources for Government of Botswana publications include originating ministries, the National Archives, the National Institute of Social and Economic Research, the University of Botswana and Swaziland, and the Institute of Development Management. With the exception of a relative few, documents are published in English. Concluding the bibliography is an author index.

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Paper copy $20.15 Microfiche $ 2.16

059 **PN-AAH-979**

ECUADOR: RURAL ELECTRIFICATION

Kessler, J.L.; Ballantyne, J.; Maushammer, R.; Simancas, N.R
U.S. Agency for International Development
1981, 65 p.

A.I.D. Project Impact Evaluation Report No. 21

The direct and indirect benefits of rural electrification in Ecuador warrant A.I.D.'s continued sponsorship of such programs This assessment of A.I.D.'s 1964–75 sponsorship of four electri-

Rural electrification--large returns for a relatively small investment.

fication projects in Ecuador concludes that, although implemented along with other development projects such as road construction, the program was a key factor in upgrading the towns of Santa Elena, Santo Domingo de los Colorados, Daule, and Ambato into regional market and service centers. The main benefits of this program, which was not originally designed to benefit the poor, were job creation, access to agricultural product processing facilities, and increased opportunities for small commercial enterprises. The growth of Santa Elena into a successful summer resort, with tourism and its related services the major economic activities, was made possible by electricity. Santo Domingo now features small industries of metal mechanics and automotive repair, as well as 67 crop processing plants for coffee, hemp, and milk. Electricity in Daule also led to local processing plants, as it led to the growth of small industry/artisanry activities in Ambato. Residential electricity has been mainly used for appliances of convenience and recreation, which is not to diminish its importance to those who made sacrifices for this luxury. The direct impact of electricity upon agricultural production has been nil, however, as has been its effect upon delivery of social services to rural areas. Since, in the absence of the development potential provided by a market town or service center, rural electrification has a low cost-benefit ratio, it should be designed as part of an integrated development process. The issue for A.I.D. is not whether electrification is worthwhile, but whether A.I.D. should alter its role from funding the purchase of equipment to providing technical assistance and training. In addition, A.I.D.'s marginally successful use of cooperatives did not correspond to local conditions and improperly employed a top-to-bottom approach. In future impact evaluations, local scientists should conduct advance field surveys. Appendices include a description of the evaluation's methodology and a 24-item bibliography (1972–80).

518006900; 518007100; 518007200; 518009900

Paper copy $ 8.45 Microfiche $ 1.08

060 **PN-AAJ-175**

THE PRODUCT IS PROGRESS: RURAL ELECTRIFICATION IN COSTA RICA

Goddard, P.O.; Gomez, G.; Harrison, P.; Hoover, G.; et al.
U.S. Agency for International Development.
1981, 83 p.

A.I.D. Project Impact Evaluation Report No. 22

Because Costa Rica had abundant hydroelectric potential and a government which was strongly committed to equitable growth, a considerable return was reaped from a relatively small investment in rural electrification (RE). This report details this success and A.I.D.'s contribution (1965–69). Aiming to diversify agriculture, increase income, expand agroindustry, and develop replicable RE cooperatives (REC's), the project produced positive but not wholly anticipated results—small sugar and rice processers benefitted more than larger enterprises in Guanacaste; San Carlos' dairy industry grew markedly but at the expense of agricultural diversification; and coffee production quadrupled and in-migration increased in San Marcos. In general, RE had the greatest impact on agricultural processing and less impact on farm-level production, partly due to the absence of outreach programs to enlist farmer participation. RE had a clearer impact on expanding health care and educational opportunity—the availability of electric lighting led to creation of an extensive night school system. In terms of quality, quantity, and cost of service (fees are based on the size of customers' property), REC's were rated highly by users. The project's success has shown that: (1) income and ability to utilize electricity are interrelated; (2) accurate forecasting in RE projects is difficult; (3) RE can be financially risky until a certain degree of growth occurs in a project area; (4) supportive government policies and funding of educational programs to motivate participation contribute to REC success; (5) RE's impact on agroindustry can be partially predicted based on existing patterns of productive activities; (6) where

RE costs can be minimized and the rural poor are concentrated, electricity can become the favored type of household energy, although firewood stoves may still be preferred for cooking; (7) RE alone does not affect rural-urban migration, but combined with other interventions it enhances rural life and stems migration. Descriptions of the REC's, RE clients, RE's value and use, the role of RE in migration, household survey methodology, and a 65-item English and Spanish bibliography (1965–80) are appended.

515009200

Paper copy $10.79 Microfiche $ 1.08

061 **PN-AAG-908**

RURAL DEVELOPMENT, WOMEN'S ROLES AND FERTILITY IN DEVELOPING COUNTRIES: REVIEW OF THE LITERATURE

Javillonar, G.V.; Zivetz, L.; Thomason, S.G.; Griffith, J.
Research Triangle Institute; South East Consortium for International Development.
1979, 298 p.

Fertility has long been a development concern, but planners have usually focused on women as targets of family planning rather than on the wider interplay between women, fertility, and development. This report, part of a series of state-of-the-art papers prepared under A.I.D.'s Rural Development and Fertility Project, examines how development changes rural women's roles and the impact these changes have on fertility. The report focuses on the role of economic, demographic, cultural, psychological, political, and family planning variables in regard to six specific development activities—participation of the rural poor, particularly women, in designing and implementing development projects; female off-farm employment; extension of rural social services; rural marketing; rural finance; and area development. The report hypothesizes that: women's participation in subsistence agriculture, cash cropping, and home-based industry are compatible with high fertility; off-farm industrial employment, access to resources, literacy training, and vocational training, which strengthens women's income-generating capacity, decrease fertility; and employment in trade and commerce is not necessarily incompatible with high fertility. By viewing each hypothesis in relation to the situations in different areas of the developing world, the report concludes that: (1) African women's status has declined and their fertility has remained high because they have not been brought into the cash economy. (2) Among the diverse group of Asian women, adoption of the Western division of labor has weakened women's traditional role in the subsistence economy and fertility continues to be high. (3) In Latin America, the machismo attitude, the Catholic Church, the extolling of motherhood, and limited participation in education and the labor force have all contributed toward high fertility. (4) In the Middle East and North Africa, male out-migration and greater educational opportunity for women have changed rural life, but because children are still valued for labor and security, fertility is high. A 58-item annotated bibliography (1960–78) and a 106-item bibliography (1965–79) are appended.

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Paper copy $38.74 Microfiche $ 4.32

062 **PN-AAH-910**

THE SECOND SEX IN THE THIRD WORLD: IS FEMALE POVERTY A DEVELOPMENT ISSUE?

Birdsall, N.; McGreevey, W.P.
International Center for Research on Women.
1978, 36 p.

Most development assistance is directed toward the poor but largely ignores the status and needs of women who may be the poorest of the poor. Little is known, however, about the participation of poor women in socioeconomic development or the hidden value of their household contributions. This report summarizes proceedings of an AID-sponsored workshop conducted by the International Center for Research on Women in Elkridge, Maryland, April 30–May 2, 1978. The report focuses on women's productivity in the household and in the marketplace; the relationship between women's productive ability in the household and household welfare; production and consumption patterns of households headed by women; and the adequacy of current socioeconomic indicators to grasp work patterns and wants of poor women. Previous employment surveys barely implied the economic contribution women make to the real income and well-being of the poor, whereas surveys of market/home time budgeting accurately portray its magnitude. To measure this contribution, full (as opposed to market) income should be evaluated. Full income is a woman's total contribution of child care, food preparation, and other home production activities to a household, expressed as services meriting monetary payment. The development of women's market productivity is limited by their nearly total responsibility for child care and menial home duties, forcing them to choose low paying work in the economy's informal sector to maintain schedule flexibility. Many daughters quit school to assist their mothers, limiting their own future access to formal employment and perpetuating the cycle of underdevelopment. Female-headed households are likely to be poorer than those headed by a male. In one study, 41% of female-headed households had incomes graded as too low to satisfy most basic needs, while only 27% of male-headed households received the same assessment. This report recommends the implementation of development projects specifically addressing the needs of women among the poor, as opposed to trickle-down efforts to assist females by improving the condition of males. Appended are 27 footnotes and a list of the 18 papers submitted at the workshop.

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Paper copy $ 4.68 Microfiche $ 1.08

063 **PN-AAJ-323**

SUCCESSFUL RURAL WATER SUPPLY PROJECTS AND THE CONCERNS OF WOMEN

Roark, P.
A.I.D., Office of Women in Development.
1980, 73 p.

The International Decade on Drinking Water and Sanitation, 1980–90, designed to bring clear water and sanitation to 1.5 billion people in developing countries, will fail unless community participation, with special emphasis on women, is incorporated into all rural water supply projects. So concludes this A.I.D. study of the meaning of community participation, how it relates to project success, and why women must be central participants. The author maintains that projects should be classified as "service" or "development" projects according to user perceptions. "Service" projects require no social change of the community in order to receive project outcome, have the assent of the local people, and can be implemented with the help of local leadership. A "development" project, however, is perceived by the community to require reorganization of social beliefs and organizations. To be effective, such projects require community participation, defined by Paulo Freire as a learning process of reflection/action/reflection through dialogue. Since women are traditionally responsible for water management and family education in most developing countries, their contribution to this learning process and dialogue is essential. The author develops a four-point operational framework for such local learning systems (LLS): (1) comparison of proposed technology to the technology currently used in terms of type and amount of change; (2) defining the learning process as one of community participation; (3) gathering pertinent information; and (4) decisionmaking. Current "development" projects fail when they attempt to use minimal community participation strategies suitable only for "service" projects rather than follow the entire participatory learning process and the LLS operational framework needed for their successful implementation. It is noted that the continued use and maintenance of a water system 5 years after project support has ended is a sure sign of genuine community participation—and hence of project success. A 99-item bibliography (1966–79) and an overview of A.I.D. activity in water supply projects are included.

AID/otr-147-80-53

Paper copy $ 9.49 Microfiche $ 1.08

064 **PN-AAJ-332**

WOMEN AND ENERGY: PROGRAM IMPLICATIONS

Tinker, I.
A.I.D., Office of Women in Development.
1980, 13 p.

Although women are the primary providers and consumers of household energy in subsistence societies, the effect of current energy shortages in increasing their workloads and threatening their ability to care for and feed their families is often overlooked. Development programs have typically benefitted men, replacing human and animal energy with all manner of machines—usually powered by some form of oil. As oil costs rise, human and animal energy will once again be used, inefficient though they may be. On the other hand, there can be no human or animal substitute for the fuels used in cooking and other household tasks. Thus, in the design of future programs, the distinction between substitutable and necessary energy will be critical. Furthermore, the design of new technologies to meet these necessary energy needs must take into account several important considerations: (1) Do the new alternatives serve the same multiple needs that current methods do? (2) Do alternative stoves accommodate local cooking methods and food preferences? (3) Have the substantially large waste requirements of biogas digesters been taken into consideration and are the benefits of the digesters obvious to the local community? (4) Can long-held biases against combining human and animal wastes as fuel be overcome? Additional information is needed about the variety of fuels used in cooking and about which human and animal tasks could be carried out more efficiently with other forms of energy. The energy crisis among the developing country poor (and the consequential lessening of their standard of living) can be alleviated only if women's needs and concerns become an integral part of the planner's framework and strategy.

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Paper copy $ 1.69 Microfiche $1.08

065 **PN-AAJ-464**

WOMEN IN MAURITANIA: THE EFFECTS OF DROUGHT AND MIGRATION ON THEIR ECONOMIC STATUS AND IMPLICATIONS FOR DEVELOPMENT PROGRAMS

Smale, M.S.
U.S. Department of Agriculture, Office of International Cooperation and Development.
1980, 192 p.

What effects did the drought of the 1970's and male migration have on the lives and income-generating ability of Mauritanian women? This report, based on a study of selected sites in Mauritania, answers that question. A Mauritanian woman's ability to earn an income is largely dictated by her ethnic group. A Peulh woman, for example, can earn a small income by selling crops grown on a portion of her husband's land, while a Bidan woman proves her status and wealth through inactivity. As self-proclaimed cultivators, Soninke women earn cash for family or personal needs by farming. Drought and migration are not new to Mauritania, but the drought of the last 10 years increased and lengthened male absences. Women have responded and adapted in their own characteristic way. Peulh women have become increasingly dependent upon agriculture

for income, growing new dry-season crops. Many Toucouleur women have sought new occupations, traveling to and from urban centers to buy and sell small goods. Bidan women, lacking skills and hindered by social stigma, engage in only sporadic leatherworking and matmaking. Many Bidan families have found themselves subsisting entirely on charity. In the past, assistance to drought-stricken areas has concentrated on providing food, medical services, and goods. Investment in income-earning activities for women has been limited to establishing educational centers to promote the preservation of sewing and artisan skills. Recommendations to increase women's income from productive activities are: (1) provide women with plots, seeds, fertilizers, tools, and wells or pump use; (2) encourage the growing of crops that can be staggered over a long season, easily stored or dried, and have greater market value than the vegetables currently produced; (3) subsidize and monitor women's savings and investment associations, providing training in accounting, marketing, or small enterprise; (4) include women in crop experiments and demonstrations; (5) promote the raising and improved tending of household animals; and (6) explore the use of forestry byproducts and seedlings as sauce, food, and/or sales sources. Appendices include a 52-item bibliography (1952–80) and English footnote translations.

PA/AG/MAU-300-1-80 930030000

Paper copy $24.96 Microfiche $2.16

066 PN-AAJ-465

INCOME GENERATING ACTIVITIES WITH WOMEN'S PARTICIPATION: A RE-EXAMINATION OF GOALS AND ISSUES

Hoskins, M.W.
A.I.D., Office of Women in Development.
1980, 48 p.

At the Mid-Decade of the Woman conference held in Copenhagen, Denmark, women from developing countries with diverse economic, social, and political backgrounds expressed a common, vital interest in income-generating projects (IGP). This paper addresses three key issues raised at the conference regarding women's IGP's: IGP goals, women's participation in IGP's, and the need for illustrative case studies of the first two issues. Women's IGP's are defined as including all self-supporting and profit-making projects in which economic, social, and political benefits accrue to and are controlled by women. Economic benefits are particularly appropriate for women, who are increasingly responsible for family support, and help increase women's stature in male-oriented home, economic, and social structures. Social benefits accrue through the formation of women's groups which enable women to control their personal safety, wages, and working conditions, and to obtain increased legal representation. Through membership in local, national, and international groups, women have become increasingly aware of their political rights and responsibilities. Such awareness can lead to increased access to government services. In practice, however, social and political benefits are often unobtainable due to prohibitions on women's organizations, while many women's IGP's are economically exploitative and dead-end as they are geared to crafts and manual skills which are soon supplanted by new technology or leave the revenue in male hands. To avoid these shortfalls as well as the false expectations arising from non-viable IGP's, women's participation in choosing, planning, implementing, and evaluating IGP's is essential. Such participation, however, can only occur within women's traditional social and familial roles. In addition, women's IGP's should be tied into larger national development programs in which funding, technical assistance, and training opportunities are more accessible. The report concludes by assessing the benefits of nine women's IGP's based on different organizational strategies. A 12-item bibliography (1978–80) and tables of project participation and impacts are included.

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Paper copy $ 6.24 Microfiche $ 1.08

067 PN-AAJ-466

CREATING A "WOMEN'S COMPENENT"; A CASE STUDY IN RURAL JAMAICA

Chaney, E.M.; Lewis, M.W.
A.I.D., Office of Women in Development.
1981, 38 p.

To incorporate women into an ongoing integrated rural development project (IRDP) in central Jamaica, USAID's Office of Women in Development (WID) designed and implemented a women's component for the project. This case study documents the genesis of this component and offers suggestions for its potential replication. After a year of operation, IRDP staff were concerned that unless women were involved in project planning and implementation, the IRDP's scope would be restricted to the soil conservation activities which are its main focus and not address the larger concerns of improving the lives of the area's 5,000 families. A WID inquiry found that the daily nutritional needs of the target families were being overlooked because of governmental emphasis on export crop production. To counteract this emphasis, the women's component was designed to increase the production of crops which not only fulfilled IRDP goals, but also addressed people's nutritional deficiencies. The Family Food Production Program emerged to help women set up family vegetable gardens that were well-suited to the land available and produced nutritious foods complementary to the local diet. Young women from the project area were recruited as home extension officers to teach participants the techniques of gardening and underwent a month's training in the use of nonformal extension teaching techniques, the principles of nutrition and health, and vegetable gardening. Despite initial logistical problems and negative attitudes on the part of project staff and the people at large, the women's component was a success—in only 9 months, 20

home extension officers had made 4,207 home visits, and 540 gardens were started. To replicate this model, the authors suggest that it be added to IRDP's during their first year, when there is still flexibility and available funding. They also stress the need to institutionalize the component's gains by linking it to original IRDP objectives, employing local women in its design and implementation, and enlisting the support of project staff. Appended are an 8-item bibliography (1975–80) along with descriptions of the women's component's goals and guidelines and a list of its training faculty.

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Paper copy $ 4.94 Microfiche $ 1.08

068 **PN-AAJ-636**

WOMEN PARAPROFESSIONALS IN UPPER VOLTA'S RURAL DEVELOPMENT

Taylor, E.
Cornell University, Center for International Studies, Rural Development Committee.
1981, 66 p.

Special Series on Paraprofessionals, No. 3

In 1967, the Government of Upper Volta, one of the world's poorest countries, began the Equal Access Project to promote the participation of rural women in socioeconomic development by increasing their access to educational opportunities and skills training. A central feature of the project is the recruiting and training of local women as village organizers and motivators (animatrices) and as midwives. These paraprofessionals work as volunteers under the supervision of a project-paid extension agent (monitrice) who lives in the same or a near-by village. This 3-month case study documents why and how these women paraprofessionals are being used in several villages and their significance for promoting women's participation in development. Many factors within the communities influence the paraprofessionals' effectiveness. Their effectiveness is increased by appropriate support from the village chief, adequate development and resources (especially water) within the village, development of a viable local committee to supervise project activities, and approval by local men. Their effectiveness is hindered by the existence of other near-by sources of income or services and previous paternalistic projects which have created expectations of gifts rather than self-help. To be successful, a paraprofessional must be dynamic, hard-working, and able to influence others. The village selection process, when representative, usually results in paraprofessionals with these qualities. Because the animatrice's role is not well defined, training, when given, is often inappropriate and of little value; training for midwives has proven more effective. Paraprofessional effectiveness is also improved by effective project administration including adequate supervision and on-the-job training by an interested monitrice, coordination with other programs, selection of project activities suitable to community needs and of technology appropriate to enhancing women's participation in development, and adequate financing. This project has shown that rural women can serve as capable paraprofessionals in rural development. Their effectiveness could be even greater with appropriate supporting administrative and financial resources.

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Paper copy $ 8.58 Microfiche $ 1.08

069 **PN-AAG-805**

KENYA—SMALLHOLDERS PRODUCTION SERVICES AND CREDIT PROJECT BASELINE SURVEY, AGRICULTURAL YEAR 1975-1976; EXECUTIVE SUMMARY AND ANALYSIS

Rusch, W.H.; Rose, T.H.
American Technical Assistance Corporation.
1977, 179 p.

The need for accurate baseline data is fundamental to the design and implementation of development assistance programs. Such data are provided in this survey of 778 small farmers in the Eastern, Western, and Southern Nyanza Provinces of Kenya, most of them participants in the Smallholders Production Services and Credit Project (SPSCP). This survey covers the agricultural year 1975–76, and contains detailed analyses of the following topics: small farmer income; overall farm production; production of individual and combined crops; land tenancy and use; labor; capital; impact of credit on income; credit demand; technical assistance; cooperatives; innovations in farming practices; participation in community activities; satisfaction with government services; indicators of economic progress; and agricultural constraints. Basic data concerning participants in the SPSCP program are also presented. Discussion is then focused upon the agricultural characteristics of each province through comparative analyses of SPSCP participants and non-participants in terms of cropping patterns, area of cultivation, off-farm income, family versus paid labor, the impact of technical training, the use of credit, the availability of water, and presence of soil erosion. For example, in South Nyanza, in contrast to the Western and Eastern Provinces, farming credit did not translate into improved performance. This situation was attributed to losses of animal holdings—which are high in the region due to death, straying, or stealing. Cropping patterns in all provinces were important in determining the profitability of a farm enterprise, with coffee producers generally earning the highest rate of return. In contrast to the Eastern province, the Western province, whose crops included only cereals and other basic foodstuffs, did poorly in animal farming because farmers in the Western Nyanza Provinces maintained a small animal stock and were therefore unable to achieve economies of scale. Findings of particular relevance for future planning of SPSCP, which is being well-received in these provinces, are noted.

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Paper copy $23.27 Microfiche $ 2.16

070 **PN-AAH-669**

RURAL NON-FARM EMPLOYMENT: A REVIEW OF THE STATE OF THE ART

Chuta, E.J.; Liedholm, C.
Michigan State University, Departmennt of Agricultural Economics.
1979, l05 p.

Michigan State University Development Paper No. 4

Rural non-farm employment's (RNFE) potential for increasing employment and incomes and improving income distribution in developing countries has roused considerable international interest. This report, part of Michigan State University's Off-Farm Employment Project, helps fill an information gap by identifying key programs and policies to generate RNFE. RNFE activities in developing countries employ 30–50% of the rural labor force in various manufacturing, commercial, and service activities; account for 20% of rural household income; offer higher wages than those earned in farming; are generally labor-intensive; and use capital more efficiently than larger enterprises. Although some specific types of RNFE appear to have declined in recent years, empirical evidence indicates that, overall, RNFE has increased in most developing countries. Future patterns of RNFE are conditioned on the forces of supply and demand. Demand for RNFE is a product of rural consumers' income, backward and forward linkages between the agricultural and industrial sectors, and urban and international demand for exports. The supply, as well as the efficiency, of RNFE depends on labor intensity, capital and labor productivity, profitability, savings, reinvestment, entrepreneurship, and economies of scale. Direct governmental assistance can significantly enhance RNFE by affecting the environment in which these activities occur, but misguided national policies regarding such variables as interest rates, tariffs, foreign exchange rates, fiscal policy, and minimum wages often distort input prices and benefit large-scale urban enterprises. To support RNFE, donors and developing country governments should provide financial, technical, production, management, and marketing assistance and, where infrastructure is adequate, establish rural industrial estates. In determining which form of intervention is most appropriate, however, planners must identify the key constraints, especially underlying constraints, which rural enterprises face and then decide which mechanisms and institutions provide the most effective means of delivering this assistance. A 160-item bibliography (1955–79) is included.

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Paper copy $13.65 Microfiche $ 2.16

071 **PN-AAH-905**

AGRICULTURAL CREDIT IN THAILAND

Meyer, R.L.; Baker, C.B.; Onchan, T.
Ohio State University, Department of Agricultural Economics and Rural Sociology; Kasetsart University, Center for Applied Economics Research.
1979, 100 p.

Revised version of "Rural Financial Markets in Thailand: Assessment and Recommendations", 1978

Thailand has sought, since 1975, to expand substantially the flow of institutional credit to its agriculture sector. This report discusses Thailand's agricultural credit system by identifying the components and the policy instruments of Thailand's rural

financial markets. The performance of the agricultural credit system is discussed and the impact of credit is assessed. Various types of formal credit delivery systems are also evaluated and statistical tables are provided throughout the report. From 1975 to 1977, the Bank for Agriculture and Agricultural Cooperatives (BAAC), the country's predominant agricultural credit institution, and the commercial banks doubled their outstanding loans to farmers, Cooperative Societies (CS), and Farmers' Associations (FA). The Government of Thailand directed this activity by mandating credit methods, e.g., imposing a quota upon commercial lending which stipulated lending either through the BAAC or directly to farmers. While encouraging credit demand, these procedures have been costly to the public and paternalistic to farmers. Apparent arrears and potential defaulting are high and threaten the system's viability. Group lending has also been encouraged in order to assist farmers lacking collateral. CS's and FA's have been reduced and consolidated to improve their operation, particularly in terms of reducing the burdens on managerial responsibilities. The authors do not see a current need for massive external assistance. Institutional credit has grown rapidly in Thailand and the credit system must be improved and consolidated before additional expansion occurs. To determine specifically what is required to assure the system's viability, studies are needed on a wide range of topics including the factors influencing the rate of returns; lending costs; the functional scope of the CS's and FA's, particularly in respect to their managerial requirements; and the effects of increased credit on agricultural productivity and rural income. These recommendations, which Thailand has the resources to implement, suggest the need to establish an evaluation and monitoring system to analyze and coordinate agricultural credit. A 25-item bibliography (1967–78) is appended.

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Paper copy $13.00 Microfiche $ 2.16

072 PN-AAJ-086

ENTERPRISE BUDGETS: A MULTIPLE USE DATA BASE FOR AGRICULTURAL BANKS IN DEVELOPING COUNTRIES

Parks, L.L.; Rockeman, K.A.; Walker, O.L.
Oklahoma State University, Department of Agricultural Economics.
1980, 74 p.

International Development Series, No. 80–1

Enterprise budgets—statements of the particular physical and financial inputs needed to obtain a specified amount of output—play an important role in institutions that finance agricultural production by providing an ex ante estimate of production costs and returns. This report focuses on developing and using standard enterprise budgets to aid agricultural development banks, specifically, the National Agricultural Development Bank of Honduras, to evaluate loans. The Bank's previous budget system had several faults. Budgets were not uniformly prepared, excluded fixed costs and some other variables, ignored regional differences, and were not prepared for livestock loans. The new budget system provides basic data required for economic analyses (e.g., farmer's loan repayment capacity, cash flow, capital needs). It is designed to be simple for Bank personnel to use, accurate yet low cost, rapid, and flexible. To assist budget preparation, Honduras was divided into 13 regions according to ecological homogeneity and Bank branches. A loan officer and staff from each area were trained. Region-specific budgets with sections on labor, contracted services, materials, other costs, total cost, detailed other costs, and profitability were prepared for all Bank-financed crops. Livestock production budgets were similarly designed but were more difficult to implement because livestock analysis was a new concept for Bank employees. Problems occurred regarding definition of terms; verification; determination of yields, wages, and livestock value; inclusion of noncommercial enterprises; rounding-off numbers; and using farm records to verify budget coefficients. The report concludes that the following contributed to the new system's success: (1) providing intensive training to branch office loan officers; (2) experimenting with different methodologies in one area to gain experience and limit errors in other regions; (3) establishing a rapport between Bank and field personnel; and (4) working from the bottom up to design a theoretically sound as well as a practicable system. Three references (1980) in English and Spanish, a training program, sample computer coding sheets, and crop budgets are appended.

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Paper copy $ 9.62 Microfiche $ 1.08

073 PN-AAJ-087

RECORDS FOR SMALL FARMS IN HONDURAS: A DEVELOPMENT AND CRITIQUE

Parks, L.L.; Rockeman, K.A.; Williams, J.E.; Hardin, M.L.
Oklahoma State University, Department of Agricultural Economics.
1980, 89 p.

International Development Series, No. 80–3

Farm records measure and monitor the heartbeat of a farm business and are a farm manager's primary tool in determining farm profitability, measuring progress, and gaining information for decisionmaking. This report, part of the Small Farmer Credit Project, summarizes the design and implementation of a small farmer recordkeeping system in Honduras. The record system was designed to obtain information needed to identify production coefficients, prices, farm resources, and borrowed resources; determine each crop/livestock enterprise's profitability, source and cost of labor, source and amount of cash flow, and consumption of farm products; and develop financial statements. Since farm management data collection was nonexistent, a record book based on the Oklahoma Looseleaf Enterprise Record Book was developed. It included sections

for receipts, farm and home expenses, labor records, crop/livestock production summaries, farm inventories, and financial statements. A local paraprofessional was trained to assist individual farmers to make entries. The program was implemented on private farms in Jutiapa, where much valuable experience was gained; in Las Playitas, where farmers were uncooperative and the program was abandoned; and in Ajuterique, the most successful site. The program was also quite successful on a cooperative farm, El Matazano. Based on the program's Honduran successes, the authors recommend that in future programs: (1) the recordkeeper, rather than the farms, be selected first and work to gain farmers' trust since he/she is the key determinant of success; (2) recordkeepers take a technical course early in the program; (3) the group of targeted farms be small enough for the recordkeeper to walk his/her rounds and be within a half-day travel from the project headquarters; (4) project personnel visit each area twice monthly and recordkeepers visit each farmer weekly; (5) farmers be presented crop summaries immediately after the crop is harvested and sold; and (6) incentives such as lending privileges be provided to encourage farmers to join the record program. A 3-item reference list (1979–80) and sample small farm data collection and farm account books are appended.

AID/ta-BMA-2 931113400

Paper copy $11.57 Microfiche $ 1.08

074 **PN-AAJ-340**

ANNOTATED BIBLIOGRAPHY ON AGRICULTURAL CREDIT AND RURAL SAVINGS: IV

Adams, D.W.
Ohio State University, Department of Agricultural Economics and Rural Sociology.
1980, 164 p.

Policies directed toward the extension of agricultural credit and the augmentation of rural savings are currently being studied by A.I.D.'s Office of Rural Development and Development Administration (DS/RAD) to determine their effectiveness. This bibliography, the fourth in a series of annotated bibliographies prepared for A.I.D. by Ohio State University, is divided into two parts. The first section contains 335 English and Spanish language titles (1957–78) concerning the growth, application, and consequences of agricultural credit. The second section presents 92 English titles (1963–78) pertaining to studies on rural savings. While both sections cite studies pertaining to developed countries (England, France, Switzerland, Canada, Japan, and the United States), the vast preponderance of studies cited pertain to developing countries in Europe (Yugoslavia); Africa (Cameroon, Ethiopia, Ghana, Kenya, Malawi, Nigeria, Zimbabwe, Sierra Leone, Somalia, Sudan, Tanzania, Uganda, and Upper Volta); the Caribbean (Dominican Repub-

The Dizon family dinner table is improving thanks in part to "miracle rice" resulting from agricultural research and to scientific farming made possible by agricultural credit.

lic, Jamaica, Trindad, and Tobago); East Asia (China, Hong Kong, Indonesia, Korea, Malaysia, Philippines, Taiwan, Thailand, and Vietnam); South Asia (Bangladesh, Sri Lanka, India, and Nepal); South America (Bolivia, Brazil, Colombia, Costa Rica, Ecuador, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, Panama, Paraguay); and the Near East (Jordan, Pakistan, and Yemen). Every entry is accompanied by a synopsis to assist the reader in making appropriate selections. Author, organization, and geographical indices are appended.

AID/csd-2501

Paper copy $21.32 Microfiche $ 2.16

075 **PN-AAJ-387**

ANNOTATED BIBLIOGRAPHY ON RURAL OFF-FARM EMPLOYMENT

Meyer, R.L.; Alicbusan, A.
Ohio State University, Department of Agricultural Economics and Rural Sociology, Agricultural Finance Program.
1979, 68 p.

As developing nations still face major impediments to large-scale, capital-intensive industrialization, developing country governments and donor agencies are paying increased attention to the importance of rural off-farm employment and small-scale industries when designing rural development strategies. Researchers have contributed to this trend by pointing out the problems many countries have encountered in pursuing large-scale, capital-intensive industrialization. Research has also demonstrated the importance of rural off-farm activities in total employment and the significant role of off-farm work in farm household time allocation and total household earnings. This 166-item, annotated bibliography summarizes some of the important recent work in this area, both published and non-published, between 1956 and 1979. Written in English and concerning English-language documents, the bibliography focuses on the results of long-term research such as investigative trips by engineers, sociologists, and resource management experts to rural development sites throughout the developing world; major scholarly papers presented at international symposia; papers published by Rand Corporation and other non-profit foundations and organizations; and rural development articles published in scholarly and technical journals. The bibliography largely ignores the substantial number of consultant reports and project documents available which deal with specific projects and programs. Although emphasis is on research conducted in developing countries, many other items of general methodological and theoretical interest are also included. The abstracts of the bibliographic items are approximately 100 words in length and cover the theme of the paper, its important factual data, and, in case there has been a research experiment or survey conducted, its methodology and overall success or failure is included. All cataloging information is provided, including the location of unpublished documents.

AID/TA-BMA-7 931116900

Paper copy $ 8.84 Microfiche $ 1.08

076 **PN-AAJ-502**

THE ECONOMICS OF COWPEA MARKETING IN NIGERIA

Ejiga, N.O.O.; Robinson, K.L.
Cornell University, Department of Agricultural Economics.
1981, 77 p.

Cornell International Agriculture Mimeograph No. 82

The traditional system of marketing cowpeas, one of Nigeria's most popular legumes, is typical of West African marketing procedures. In light of the accepted view that the Nigerian cowpea market is inefficient in distributing goods to consumers and inputs to producers, this study, based on sample surveys at two representative production-consumption sites in Northern Nigeria, clarifies that market's shortcomings and positive characteristics. To this end, the study describes cowpea marketing channels and the role of intermediaries; determines temporal and spatial price relationships and the costs and returns of cowpea storage; and examines farm-retail price relationships for evidence of exploitation of farmers or consumers by traders or middlemen. The study found, surprisingly, that cowpea distribution throughout Nigeria is well organized, effectively linking surplus-producing areas to deficit areas; and that storage capacities for cowpeas are adequate, if not always of the best quality. Storage was found to be not profitable unless cowpeas were held for at least 6 months, with storage for 8 months yielding maximum gains. The uncertainty of future harvests and the high variability in cowpea prices, however, tend to discourage farmers and traders from attempting to store from one season to the next. To calculate price efficiency, price differences between markets were compared with transfer costs and correlated with distance. Wholesale and retail prices showed a high degree of correlation between prices at different stages of marketing and between nearby rural and urban markets. Estimates of marketing margins accruing to various middlemen showed a fair degree of consistency in the margins of the same class of traders in different locations. The study concludes that the traditional food grain marketing system has an efficient and competitive pricing mechanism, but is operationally inefficient because of storage and transfer losses. It is recommended that efforts to upgrade the latter area, e.g., by improving transport, storage, and processing facilities and by standardizing weights and measures, receive high priority. A 46-item bibliography (1958–75) and three statistical appendices are included.

AID/ta-BMA-8 931113700

Paper copy $10.01 Microfiche $ 1.08

077 **PN-AAJ-503**

ECONOMIC FEASIBILITY OF IMPORT SUBSTITUTION OF LIVESTOCK FEED IN THE CARIBBEAN COMMUNITY

Charles, C.F.; Blandford, D.; Boisvert, R.N.
Cornell University, Department of Agricultural Economics.
1980, 52 p.

Cornell International Agriculture Mimeograph No. 80

Widespread use of import substitution (replacing imported with domestic goods) in the Caribbean Community (CARICOM) makes CARICOM an ideal focus for evaluating the viability of this strategy. This study examines the economic feasibility of import substitution for livestock feed (corn and soya) in CARICOM, with emphasis on the associated costs and implications for land and labor use, sugar production and exports, and foreign exchange balance. Two major conclusions are reached. First, had a corn/soya industry existed in 1975 under a free trade regime, CARICOM corn imports could have been reduced 45%, soya meal imports 46%, and soya oil imports 34%. Secondly, CARICOM land and labor resources are adequate to achieve self-sufficiency in either feed (corn and soya meal) or soya oil, but not in both. Because soya meal and oil are joint products, self-sufficiency in feed is economically more beneficial because it would reduce soya oil imports by 40% over 1975 levels. However, the implications of self-sufficiency differ significantly among CARICOM countries. Feed grain production increases employment in Guyana, but reduces it in Trinidad, Tobago, and Jamaica. Although CARICOM's overall foreign exchange position improves, it deteriorates in some individual countries, e.g., Trinidad, Tobago, and Jamaica (due to losses in sugar production when land is diverted to corn or soya). The use of trade restrictions to achieve self-sufficiency does not appear to be a viable alternative. Quotas, the simplest way to achieve import substitution, are not well accepted internationally and effective tariffs would be excessively high (50%), while a common tariff would excessively protect individual countries. The authors conclude that while import substitution of corn and soya is economically feasible for CARICOM as a whole, particular countries benefit at the expense of others. While this makes achievement of regional self-sufficiency difficult, the competitiveness of some countries under free trade suggests that promoting the corn/soya industry could be worthwhile. An explanation of the study's analytical framework, programming results for labor-intensive technology, and a 24-item bibliography (1964–79) are appended.

AID/ta-BMA-8 931113700

Paper copy $ 6.76 Microfiche $ 1.08

078 PN-AAJ-657

STUDY OF TRANSPORT INVESTMENT AND IMPACT ON DISTRIBUTION OF INCOME IN REMOTE AREAS, PHASE I FINAL REPORT

Louis Berger International, Inc.
1979, 449 p.

Sponsored by Southeast Asian Agency for Regional Transport and Communications Development

Public transport investment is a classic approach to stimulating economic development, but success has traditionally been measured in terms of overall contribution to a nation's economy. Little attention has been given to the distribution of economic or less easily quantifiable social costs and benefits. This report describes Phase I of the AID-funded Southeast Asian Agency for Regional Transport and Communications Development (SEATAC) RR-2 Project to develop and test a theoretical model of the distributive impacts of transport investment. Four types of transport investment were studied. Data was collected and 1,200 households and other individuals were interviewed from Indonesia, Malaysia, the Philippines, and Thailand. The model was adjusted to reflect the project's limited resources; some indicators were changed, and components such as environmental and short-term employment-generation analyses were dropped. Although only partly attributable to transport investment, all areas experienced significant yearly growth rates in economic activity (5–6%) and per capita income (2.5–3.5%). The report concludes that public transport investment: (1) usually improves travel time, comfort, and convenience significantly; (2) substantially increases the number of vehicles in use; (3) provides an incentive for private transport and communications investment; (4) encourages cash crop production and marketing of perishables but does not affect subsistence crop production patterns; (5) expands the nonfarm sector but does not induce establishment of agro-processing industries; (6) draws subsistence farmers into the cash economy by increasing the number and circulation of traders; (7) is likely to encourage a net migration of settlers, including government officials, into remote areas; (8) increases the opportunity for service delivery and use; (9) raises incomes and widens the range of incomes; and (10) in general, is positively viewed by the residents affected. Field work survey forms, a list of relevant weights and measures, the methodology for assessing income distribution impacts and measuring accessibility, and a list of RR-2 workshop participants are appended.

AID/otr-C-1788

Paper copy $58.37 Microfiche $ 5.40

079 PN-AAJ-701

DETERMINANTS OF FOOD CONSUMPTION IN RURAL SIERRA LEONE: APPLICATION OF THE QUADRATIC EXPENDITURE SYSTEM TO THE CONSUMPTION-LEISURE COMPONENT OF A HOUSEHOLD-FIRM MODEL

Strauss, J.; Smith, V.; Schmidt, P.
Michigan State University, Department of Agricultural Economics.
1981, 48 p.

The unintentional, yet frequent effects of developing country policies on the nutritional well-being of their citizens fall particularly on business people who can adjust outputs, inputs, labor, and consumption in response to price and other socioeconomic variables. This paper reports the estimation of a quadratic expenditure system for a proposed "household-firm" model for measuring allocation of total household resources between consumption and leisure. (The household is treated as a "firm" or business in that account is taken of the effect of socioeco-

nomic variables on household production and labor supply.) The data were gathered from a cross-section of rural households in Sierra Leone during the 1974–75 cropping year. Of significance for development efforts is the general proposition resulting from the study that food demand is responsive to price (except for root crops and other cereals). Price, as an important short-term allocator of food consumption and hence caloric consumption, has been stressed recently by Mellor (1975) and Timmer (1978). Mellor focused on the effect of price on real income, and this study supports his view. However, this study also found, contrary to what was expected, that own-price substitution effects are also important. This was partly due to the commodity disaggregation used (five food groups, including two of staples). Information important to the nutritional planner is also provided. For example, the negative uncompensated effects on root crops with respect to rice price mean that decreases in rice price are not likely to be compensated by increases in cassava consumption; rather, the opposite occurs. Since people shift their production and sales patterns when faced with relative price changes, there is a need to estimate the household-firm model's production side, something which will be done in future work. Investment in fixed production and human capital variables as well as changes in household size and composition were deemed outside the scope of the study. A list of 54 Michigan State University rural development papers and working papers (1964–80) is appended.

AID/DSAN-C-0008 931131500

Paper copy $ 6.24 Microfiche $ 1.08

080 **PN-AAJ-702**

JOINT DETERMINATION OF FOOD CONSUMPTION AND PRODUCTION IN RURAL SIERRA LEONE: ESTIMATES OF A HOUSEHOLD-FIRM MODEL

Strauss, J.; Smith, V.E.; Schmidt, P.; Whelan, W.
Michigan State University.
1981, 88 p.

Working Paper No. 17; Consumption Effects of Economic Policy Project Report No. 6

In predicting the unintended effects of government policies on the availability of nutrients to the household, it makes a difference whether a household is also a "firm", that is, it can adjust its production activities in response to changed circumstances (e.g., changes in prices). To determine differences in consumption response concretely, a cross-section of households in Sierra Leone were surveyed during the cropping year 1974–75 in terms of the consumption response of five food items, nonfoods, and labor supply to prices, total income, and certain demographic variables when household firm profits (and hence production) were held fixed. For estimation purposes, a recursive household firm model was derived, i.e., the household's production decisions are made first and then used in allocating available "total income" between consumption of goods and leisure. The model's production side is estimated and the results from the demand and production sides are integrated through use of functional forms that permit (given certain simplifying assumptions that enable the proper statistical handling of zero outputs) a wide variety of behavior in regard to several commodities. Next, the effects of constant and variable profits on caloric intake are estimated. A finding of particular importance for Sierra Leone—where malnutrition among children under five is the greatest nutritional problem—is that while the very poor can use increased household net income to increase caloric intake from rice, given constant prices, total income would have to increase 88% to raise caloric intake from the current 1,200 calories per capita per day to the minimum daily requirement of 1,900 calories per capita. A trade-off between long-term production increases and short-term improvement in nutritional status thus seems necessary. It is suggested that production increases can benefit the lowest-expenditure households if they participate in the technical changes causing these increases. The study concludes by discussing trade-offs in terms of efforts to obtain rice self-sufficiency and to promote exports of cash crops such as palm oil, coffee, and cocoa. A 73-item bibliography (1961–81) is appended.

AID/DSAN-C-0008 931131500

Paper copy $11.44 Microfiche $ 1.08

081 **PN-AAH-413**

FOTONOVELAS AND COMIC BOOKS; THE USE OF POPULAR GRAPHIC MEDIA IN DEVELOPMENT

Parlato, R.; Parlato, M.B.; Cain, B.J.
1980, 247 p.

The fotonovela and the comic book have long been popular forms of entertainment in many parts of the world. But they have also had more substantive purposes. During the last 25 years, comic books have been used in the United States to reach children and adolescents regarding important social problems. In addition, within the last few years population planners have discovered the melodramatic fotonovela as an ideal format to address the highly emotional problems of unwanted pregnancies and changing sexual attitudes and social roles. This study, comparing fotonovelas and comic books as tools in delivering family planning and other development messages, revealed the following strengths and weaknesses of each: (1) Fotonovelas appear to be more effective in reaching literate and semiliterate audiences. (2) The fotonovela has a visual, highly emotional quality which appeals more to larger audiences than does the comic book. (3) The comic book is better suited to delivering messages involving external action. (4) The comic book is highly culture-sensitive and can present the same information in a variety of ways. (5) The comic book remains an ideal medium for communicating social messages to children and adolescents. (6) Both the fotonovela and the comic book have a certain negative social stigma attached to them. Examples of "family planning" fotonovelas and comics from throughout the world are reproduced and critiqued in this report. Overall, these educationally oriented productions lacked the vitality and spirit of their commercial counterparts. Their lack of success stems from an incomplete appreciation of the traditional conventions and generic structure which give comic books and fotonovelas their inherent appeal. Problems involving distribution, cost, and production are also discussed in the report. Appendices include an evaluation of eight fotonovela and comic book series currently distributed by private voluntary organizations and developing country governments, a review of psycho-perceptual research (with bibliography), a list of persons and institutions contacted during the preparation of this report, and a general bibliography (35 entries, 1965–77).

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Paper copy $32.11 Microfiche $ 3.24

082 **PN-AAJ-088**

TRAINING PROGRAMS FOR AGRICULTURAL DEVELOPMENT BANK PERSONNEL: THE HONDURAS EXPERIENCE

Parks, L.L.; Badger, D.D.
Oklahoma State University, Department of Agricultural Economics.
1980, 133 p.

International Development Series, No. 80–2

Agricultural credit institutions in developing countries are often responsible for providing a variety of services within the banking sector, many of which they are unqualified to perform. This report outlines and analyzes a training program designed and used by Oklahoma State University in the Small Farmer Credit Project to train personnel at the National Agricultural Development Bank of Honduras. Based on criticisms of earlier training programs, it was decided that participation and practical exercises should be stressed; courses should be limited to 30 participants and should not exceed one week; subject matter should clearly relate to Bank and employee needs; and ample material should be on hand to ensure adequate coverage in rapidly taught courses. Timing of the courses was constrained by the need to first develop and test the methodologies to be institutionalized. The subject matter was organized into two courses focusing on traditional farm management. The first course covered such topics as the concept of fixed and variable costs, synthesis of enterprise budgets, and the use of budgets in farm financial analysis. Graduates of the first course were offered a second course which covered the same topics on a deeper level and included basic economic concepts. Follow-up sessions pertaining to specific questions which arose during either course were conducted. A one-day seminar on preparing farm records was also offered. Loan officers and credit analysts were targeted due to their direct contact with loan recipients and their general inadequacy in economics, accounting, and finance. The report recommended that future programs: (1) include managerial personnel from the outset; (2) schedule courses and confirm attendance far in advance; (3) not plan courses back-to-back; (4) have more complete syllabi; (5) eliminate coverage of cash flow and present value and place greater emphasis on livestock analysis and partial budgeting; and (6) use more thoroughly developed teaching methodologies. Outlines and selected materials from the two courses and sample forms from the farm records training course are appended.

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Paper copy $17.29 Microfiche $ 2.16

083 **PN-AAJ-168**

U.S. AID TO EDUCATION IN NEPAL: A 20-YEAR BEGINNING

Sellar, P.O.; Sprague, D.; Miedema, V.
U.S. Agency for International Development.
1981, 90 p.

A.I.D. Project Impact Evaluation Report No. 19

Primary education is alive, if struggling, in Nepal. This report measures the impact of A.I.D.'s educational projects in Nepal over a 20-year period (1954–75). After briefly describing the genesis of Nepal's education modernization program, to which A.I.D. has been the only major donor, the authors evaluate the program's successes and shortfalls. Successes include dramatic increases in the numbers of primary schools (PS) (from

321 to 8,708), PS students (0.9–59% of that age group), PS teachers (640–17,728), secondary schools (11–2,809), secondary school enrollment (0.15–24%), an increased literacy rate (2%–17%), and development of a cadre of 310 trained educational administrators (a key area of A.I.D. assistance), a totally Nepali curriculum, and a superior textbook production and distribution system. Nevertheless, severe problems remain. Stressing quantitative expansion has led to low quality and levels of learning (especially in writing and mathematics), a 50% rate of student dropout before functional literacy is attained, and schools that are isolated (in rural areas), overcrowded (in urban areas), and unhealthy. Due to advancement opportunities for trained teachers—the largest area of A.I.D. assistance—and increases in the number of PS's, qualified teachers are still in short supply. The vocational training (VT) system has failed due to insufficient training levels, lack of employment incentives, and student use of the system as a springboard to college. At the same time, as in other countries, the development of basic education in Nepal has impacted positively on economic and agricultural development, fertility rates, health, and women's role and societal status and has generated attitudes conducive to overall development. The success of A.I.D.'s assistance, which should motivate further A.I.D. education assistance efforts, demonstrates that significant impact is possible when consistent support is given over a sufficient period of time and when local as well as U.S. costs are financed. Other lessons learned include the need to develop innovative educational approaches and to improve VT programs by correcting the above deficiencies. Appendices include a 61-item bibliography (1954–80).

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Paper copy $11.70 Microfiche $ 1.08

084 **PN-AAJ-169**

KOREA ELEMENTARY-MIDDLE SCHOOL PILOT PROJECT

Witherell, R.A.; Morgan, R.M.; Hyung-Won, Y.; Son-Ung, K.; Chong-Jae, L.
U.S. Agency for International Development.
1981, 81 p.

A.I.D. Evaluation Special Study No. 5

Although the value of Instructional Systems Design (ISD) had been proven, ISD had never been applied on a large-scale in a developing country until A.I.D. funded such an effort in the Republic of Korea (ROK) from 1972–77. This report draws several conclusions based on this success. Although converging factors—deep cultural respect for education, a growing cadre of trained educators, an urgent need for educational reform, and a motivated government—made the setting ideal, the project clearly proved the value of ISD to a developing country's educational system. In seeking to provide cost-effective education to prepare Korea's youth to enter the working world, the project, implemented by Florida State University, established the Korean Educational Development Institute (KEDI) to orchestrate reforms, including a modernized curriculum reflecting Korean culture and the technical needs of a growing economy; development of guides to upgrade instructors' capabilities; the introduction of Instructional Radio, Educational Television, and correspondence high schools; a rapid increase in higher education enrollment; abolition of private tutoring which had favored the wealthy; and creation of an Educational Research Information Clearinghouse and a 14–year Educational Development Plan. The report concludes that: (1) many countries need institutions such as KEDI, staffed by committed and purposeful people, to invent functionally useful educational practices; (2) flexible project execution is essential to meet changing circumstances and maintain host country support; (3) A.I.D. programs should give priority to proven technologies in which the United States leads; (4) continuity of technical assistance from a qualified source strengthens a donor's contribution; (5) in any potentially controversial project, selling the project concept is as important as good implementation; and (6) donors often attempt too much without providing adequate time and money. The evaluation methodology and a list of interviewees; notes on the authors; a 12-item bibliography (1971–81); project and education sector data; an overview of KEDI; lists of KEDI publications and visitors to KEDI; and recommendations for the ROK are appended.

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Paper copy $10.53 Microfiche $ 1.08

085 **PN-AAJ-171**

THAILAND: RURAL NONFORMAL EDUCATION—THE MOBILE TRADE TRAINING SCHOOL

Giovanni, R.S.; Armstrong, L.T.; Jansen, W.H.
U.S. Agency for International Development.
1981, 43 p.

A.I.D. Project Impact Evaluation Report No. 25

Each year Thailand's Mobile Trade Training Schools (MTTS's) teach employable skills to 30,000 rural men and women who might otherwise move to the cities and join the ranks of the urban unemployed. This report traces the history and analyzes the impact of MTTS's. In 1960, despite a 30% literacy rate among the 87% of Thailand's population which was rural, educational change came slowly and favored the cities. Based on the belief that peasants valued education, the MTTS's were designed in the early 1960's to operate from provincial polytechnic schools, using portable tools and travelling instructors, to teach employable skills to drop outs. Under USAID assistance (1966–72), the 45 MTTS's became more permanent and expanded their courses to include skills upgrading and skills for personal use in traditional subjects (e.g., auto mechanics, dressmaking) and newer fields (air conditioning, radio repair). Of the 80,000 students enrolled, 56,000 graduated, and many non-graduates acquired employable skills. Since 1972, MTTS's

have had a lasting impact on the Thai educational system and on the lives of the rural poor, supporting and diversifying rural values and offering a local alternative to the traditional apprentice system. About one-half of the MTTS's are still operating, but many others have been absorbed by a broader nonformal education system of Lifelong Education Centers which are modelled on the MTTS's, employ many MTTS teachers, and, together with the MTTS's, annually enroll 40–45,000 students. The success, popularity, and endurance of MTTS's has shown that: (1) Providing short-term vocational training to a large number of marginally educated people can positively effect rural development. (2) Nonformal education can integrate the rural poor into the mainstream of national life and thus aid national unity. (3) Projects conceived to serve a limited purpose can sometimes become a catalyst to broader development efforts. (4) Projects which appeal to the perceived needs of beneficiaries can succeed—contrary to conventional wisdom—even without beneficiaries participating at the design stage. MTTS enrollment and staffing data, a course listing, and profiles of six graduates are appended.

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Paper copy $ 5.59 Microfiche $ 1.08

086 **PN-AAJ-173**

NORTHERN NIGERIA TEACHER EDUCATION PROJECT

Mitchell, R.E.; Seymour, J.M.; Tuckman, H.F.
U.S. Agency for International Development.
1981, 51 p.

A.I.D. Project Impact Evaluation Report No. 23

Although the design and perspective of the Northern Nigeria Teacher Education Project (NNTEP: 1965–69) were deficient, and little progress was made toward end-of-project objectives, NNTEP was nonetheless a success. This document describes the lessons provided by NNTEP for the design and implementation of future participant training programs, especially those in the education sector. The authors' major conclusion is that NNTEP's unanticipated effects had a more important and longstanding impact on the leadership and institutional development of the Nigerian education system than did the negligible progress made in improving the quality and efficiency of primary teacher training. After describing the project's history and original objectives, the paper discusses several impediments to the achievement of A.I.D. expectations. For example, the University of Wisconsin (UW), which implemented the project, had insufficient experience and time to devote to curriculum development, despite A.I.D.'s emphasis on this particular component. Nevertheless, the collaborative work on curriculum development between UW and the Ahmadu Bello University Institute of Education (IE) contributed substantially to IE's growth as a major educational resource and influence in the region. Another of NNTEP's major achievements was the development of a regional consensus on examinations and curriculum. A key lesson taught by NNTEP is that the training program's success was largely due to highly motivated trainees, committed mid-career professionals, and host country recognition of the contracted U.S. university as a superior institution. NNTEP also demonstrated, however, that curriculum reform cannot be achieved overnight and, more generally, that technical assistance projects must be designed with realistic implementation schedules and carefully delineated supervisory responsibilities. A.I.D. should show host governments alternative, least-cost solutions to stated policy goals, including one of the most effective of such strategies, participant training. Appendices on evaluation methodology, NNTEP curriculum development, and the expansion and financing of the Nigerian educational system are included.

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Paper copy $ 6.63 Microfiche $ 1.08

087 **PN-AAJ-275**

IS THE SCHOOL THE ENEMY OF THE FARM? THE AFRICAN EXPERIENCE

Hanson, J.W.
Michigan State University, Department of Agricultural Economics.
1980, 106 p.

African Rural Economy Paper No. 22

It is often assumed that the primary school (PS), the educational institution which reaches the greatest number of African people, has reinforced attitudes in school children which promote migration in search of urban employment, thereby failing to encourage modernization in farming. According to the author of the present report, however, field studies indicate that general societal and economic factors, rather than the schools themselves, are the sources of these attitudes. Field studies also indicate that PS's have an untapped potential to combat farm attrition and to promote updated farming methods. The following results of surveys from various locations are cited in support of this thesis: (1) Preferred and adjusted occupational aspirations of PS students and PS drop outs show high acceptance of farm occupations. (2) One sample of farm settlement workers recommends farm work to school drop outs because "it gives you money, food, and a good future." (3) Secondary school respondents list occupations in modern agriculture as first choice. (4) The percentage of respondents who had migrated to cities at some point in their lives increased with their educational levels. However, many of these respondents migrated for further schooling only and returned as soon as they could. (5) High return rates to interrupted primary education show that primary school is not necessarily a dead-end enterprise. One survey provides data which refute the author's thesis, since it shows that although farmers located near innovative agricultural institutions are willing to adopt innovations suggested by these institutions, this willingness does not vary by educational level. In conclusion, the author recom-

mends that a greater percentage of education funds be allocated to PS's; that PS curricula in rural Africa be tailored to local needs and not merely duplicate typical "Western" schooling; and, in particular, that PS's concern themselves with portraying modernized agriculture as a lucrative future occupation. A 126-item bibliography (1960–79) of French and English titles, a list of 22 African Rural Employment/Economy Papers, and a list of 22 African Rural Employment/Economy Working Papers are appended.

AID/afr-G-1261 625090700

Paper copy $13.78 Microfiche $ 2.16

088 **PN-AAJ-333**

AUDIO-VISUAL TECHNIQUES FOR RURAL DEVELOPMENT: A WORKING BIBLIOGRAPHY

Van Dyk, D.
Michigan State University, Department of Agricultural Economics.
1980, 21 p.

African Rural Economy Working Paper

An understanding of the mentality and cultural traditions of developing country peoples is a requisite for the success of even the most up-to-date rural development strategies. This bibliography of English and French publications on the relation of communication to development, with special emphasis on the use of audiovisual techniques, thus provides those designing and implementing rural development programs with a valuable working tool. The bibliography includes 11 subject areas: (1) a 14-item overview (1963–76) of communication and development literature; (2) a 14-item section (1953–75) on the socioanthropological aspects of communication and development; (3) eight titles (1966–74) on the importance of art and symbolism in communication and development; (4) 36 references (1963–74) on media's role in development; (5) a 17-item overview (1962–77) of educational technology literature; (6) 38 titles (1962–78) relating to audiovisual techniques; (7) a list of 14 items (1954–77) on the use of film and video techniques; (8) a 40-item section (1946–76) on the use of radio in development; (9) 15 titles (1968–78) on education and development; (10) a 30-item listing (1969–77) regarding nonformal education and literacy programs; and (11) a list of seven bibliographic guides (1972–77). Because the bibliography was prepared as part of Michigan State University's African Rural Economy Program, a significant number of entries relate to issues pertinent to African rural development.

AID/AFR-G-1261

Paper copy $ 2.73 Microfiche $ 1.08

089 **PN-AAJ-433**

READING BY RADIO; A POSITION PAPER ON THE USE OF RADIO IN TEACHING READING SKILLS FOR EDUCATIONAL DEVELOPMENT

Imhoof, M.
Academy for Educational Development.
1981, 35 p.

Radio has significant potential for teaching language skills, especially reading, critical to the progress of developing countries. To support this thesis, this paper discusses the importance of language skills for developing country educational development and the usefulness and appropriateness of radio in advancing these skills. Language learning is basic to educational development, because language helps increase literacy rates in both the vernacular, thus enhancing national identity and pride, and in international languages, thus facilitating the country's entrance into international business and politics. Despite this importance, language planning has only recently been integrated into educational planning (itself a latecomer in development planning). As a tool in the general educational process, radio possesses several advantages: it is low in cost, has immediate appeal, combines easily with other instructional modes, and is suitable for non-literate audiences. These factors allow radio to improve educational quality and relevance, reduce educational costs, and improve access to education, especially in rural areas. Radio has been widely used for language instruction specifically and has proven especially helpful in upgrading the skills of unqualified teachers. After outlining the profound causal relationship between reading and the development of personal awareness of self and the world, as revealed in contemporary psycholinguistics, and the particular problems inherent in learning to read a second language, the author shows that radio is ideally suited for language instruction since it provides the opportunity to master new and different sounds, to repeat new grammatical devices in a variety of ways, and to practice new vocabulary in entertaining but extensive contexts. The use of radio for language instruction is particularly recommended in developing countries short on finances and long on language arts deficiencies. Such use will be successful, however, only if programs are continually funded, address the specific needs of the audience, and are professionally produced. Appended are a 14-item reference list (1970–80), the titles of six bibliographies, and a 30-item reading list.

AID/DSPE-C-0051 931101700

Paper copy $ 4.55 Microfiche $ 1.08

Education's impact upon the development process cannot be fully assessed, as half of the world's population can neither read nor write.

090 **PN-AAJ-460**

A.I.D. ASSISTANCE TO EDUCATION: A RETROSPECTIVE STUDY

Method. F.J.: Shaw. S.K.
Creative Associates.
1981, 231 p.

Was the $3.8 billion A.I.D. spent on educational assistance (EA) between 1960 and 1980 effectively used? Based on a study of EA structure, funding, and distribution, the authors of this report conclude that A.I.D. implemented EA programs as directed, but that the programs did not meet developing nations' perceived needs. From 1960 to 1966. A.I.D. concentrated on projects in Africa, but lacked clearly formulated educational objectives. From 1966 to the early 1970's, A.I.D. responded to Congressional and budgetary strictures and developed a strategy to provide teacher training programs rather than increased teacher supply and shifted its regional emphasis to the Near East/South Asia and Latin America. In the early 1970's, A.I.D. began a period of reassessment due to a more clearly articulated Congressional mandate emphasizing nonformal education, educational media and technology, training in health/nutrition. population, agriculture, and the participation of women and the rural/urban poor. While A.I.D. continues to lead in the latter areas, EA recipients, during the 1970's, began expressing a need for upper-level, institutional EA. Because A.I.D. did not respond to these needs, its role as the leading EA donor has declined markedly over the last 10 years. Another contributing factor to A.I.D.'s eclipse among EA donors has been the 50% drop in real A.I.D. spending for EA since the late 1960's. To aid and clarify the EA policy debate underway now in A.I.D., an improved project classification system is necessary. Future A.I.D. EA program effectiveness appears to depend upon the degree to which: (1) a consensus can be reached on an EA strategy and on the educational requirements of programs in other sectors; (2) clear criteria are developed for EA allocation among recipients; (3) EA resource levels are raised and made predictable for long-term planning; (4) complex programming guidelines are relaxed to respond to locally assessed needs rather than just to centrally mandated programs; and (5) the centrality of EA and human resources in all development programs is officially recognized and encouraged. Appended is a 44-item bibliography (1962–81) of A.I.D. official policy papers, working papers, airgrams, annual statistical reports and non-AID papers bearing on EA

AID/DSPE-C-0075 931030000

Paper copy $30.03 Microfiche $ 3.24

091 **PN-AAH-444**

A.I.D. INTEGRATED LOW COST HEALTH DELIVERY PROJECTS: VOLUME I PROJECT SUMMARIES

Baumslag, N.; Cox, K.; Laskin, M.; Sabin, E.
U.S. Department of Health, Education, and Welfare, Office of International Health.
1978, 300 p.

Volume II: PN-AAH-445, 101 p.

Prior to the introduction into development assistance projects of strategies aimed at meeting basic needs, nearly half the world's population received no, or at best rudimentary, health care. Since 1976, A.I.D. has steadily increased funding of its health assistance projects, with emphasis on developing integrated low-cost health delivery systems which combine health, family planning, and nutrition interventions targetted primarily at rural populations. This report, the first of two volumes, summarizes 39 of A.I.D.'s integrated health delivery projects, either ongoing or planned for implementation by 1979, in Africa, Asia, Latin America, and the Near East, as described in A.I.D. project papers (PP) or project identification documents (PID's). Project summaries describe the project purpose, outputs, and inputs; planned health, nutrition, and population components; host country and other donor involvement; financial requirements; and project cost, duration, area of coverage (regional or national), and target population. Also summarized are pertinent issues, as discussed in the PP or PID, such as level of host-country commitment and requirements, personnel selection and training, local community acceptance of a project, and coordination of multidonor efforts so as to avoid duplication. In general, two-thirds of the projects, which in toto encompass a target population of 45 million, are aimed at regional populations. Nutrition components tended to be weaker than other components. For example, provision of iron and vitamin supplements to diets is infrequent; promotion of breastfeeding occurs in only six projects; the content and organization of nutrition education is not clearly defined; and many tasks associated with nutrition components are delegated to the lowest level worker (often village volunteers) with the least education, training, or pay—implying a low priority to nutrition intervention. The innovative feature of these projects is the use of health auxiliaries who will provide preventive and simple curative health care on a large scale—an approach previously successful at experimental levels—although many of the personnel, training, and organizational issues remain to be resolved.

RS/HEW/OIH-01-77 931119800

Paper copy $39.00 Microfiche $ 4.32

092 **PN-AAH-445**

A.I.D. INTEGRATED LOW COST HEALTH PROJECTS: VOLUME II ANALYSIS

Baumslag, N.; Roesel, C.; Sabin, E
U.S. Department of Health, Education, and Welfare, Office of International Health
1978, 101 p

Volume I: PN-AAH-444, 300 p.

A.I.D. has been a pioneer in advocating low-cost, integrated primary health care systems to alleviate the dire health conditions of the rural poor in developing countries. This contractor's report, the second of two volumes, analyzes the nutrition interventions in 39 A.I.D. primary health care projects in Africa, Asia, Latin America, and the Near East. The first volume provided a general review of the individual projects. Introductory sections provide an overview of A.I.D.'s primary health care projects in terms of the health background of AID-assisted countries, target populations, project funding, health care personnel (especially village health care workers), and degree of integration of health, nutrition, and family planning services. In regard to nutrition interventions, it was found that only 18 of the 39 projects utilize, in varying degrees, the minimum nutrition activities suggested by the World Health Organization (WHO): nutrition surveillance and education, control of infectious diseases, nutritional supplements, and nutrition recuperation. A number of the 18 projects lack even these minimum interventions. At the same time, A.I.D. projects do involve a broader range of nutrition interventions than those listed by WHO. These include breast-feeding, use of mass media to promote nutrition education, development of garden projects, and improving sanitation. Several areas in which the nutrition component of A.I.D. primary health care projects can be improved are specified: weight charts, supplemental food, anemia, breast-feeding, weaning, immunization, disease control, and family planning. General and specific recommendations are made to implement these improvements by tapping the knowledge, motivation, and organizational/communication skills of implementing personnel. Results of two other studies of small, privately-funded, low-cost primary health and nutrition projects are included for comparison. Also included are tables illustrating the report's findings.

RS/HEW/OIH-01-77 931119800

Paper copy $13.13 Microfiche $ 2.16

093 **PN-AAJ-176**

PERU: CARE OPG WATER HEALTH SERVICES PROJECT

Haratani, J.; Viveros-Long, A.M.; de Gonzalez, A.M.
U.S. Agency for International Development.
1981, 52 p.

A.I.D. Project Impact Evaluation Report No. 24

Where piped water is a local priority, A.I.D. should be willing to authorize projects aimed solely at improving the accessibility, quantity, and quality of water to the exclusion of other health interventions. This and other lessons found in this report were learned in an AID-funded CARE project to provide piped water, vaccinations, health education, and sewers in Peru's Ancash Department. For a $20 fee and less than 15 cents per month, 2,600 households in the smallest villages received piped water from 29 gravity-fed water systems which supplied 60 liters of

potable water per day. The impact was pronounced. Not only did use of piped water for drinking, cooking, and bathing increase, but because women no longer needed to spend 3 hours each day collecting water, there was more time for productive activities such as weaving. Unexpectedly, women also made inroads into the male-dominated social structure by participating in the village juntas which conducted many project activities. Because the project produced lasting tangible benefits, villagers' predisposition to community action was stimulated. On the other hand, the vaccination program was cancelled; there was no indication that health education improved health, and, because of higher installation costs and fewer perceived benefits, only five sewer systems were built. The project also showed that: (1) development projects often upset the status quo and cause conflict among implementers; (2) private voluntary organizations can be a valuable resource in specialized projects; (3) when a project's purpose is to provide drinking water, perfunctory evaluations attempting to attribute health impacts to the project should not be conducted; (4) since imported materials often become a limiting factor, use of local construction materials, even when more expensive, should be encouraged to enhance a project's sustainability and to support local industry; and (5) where voluntary participation in community projects is traditional, food for work can be counterproductive. The evaluation methodology and persons contacted; the project budget, design, and chronology; water system diagrams and statistics; and recommendations for the Government of Peru are appended.

AID-527-0177-G-T 527017700

Paper copy $ 6.76 Microfiche $ 1.08

094 **PN-AAJ-288**

A REVIEW OF HEALTH, POPULATION, AND NUTRITION ACTIVITIES IN THAILAND.

Stewart, M.M.; Dworkin, D.; Rogers, B.L.
American Public Health Association.
1980, 63 p.

To assist USAID/Thailand and the Royal Thai Government (RTG) to achieve their common goals of reducing infant and child mortality, increasing life expectancy, and reducing population growth, a three-member consulting team was asked to evaluate and recommend ways to improve the primary health care delivery system, which currently serves only 15% of the population. This report details the team's major findings, recommending changes and activities in five general areas. (1) Primary Health Care: As rural coverage by health services is incomplete, existing services should be evaluated and targeted to persons of greatest need. The duties of all village health workers (VHW) should be clearly defined and prioritized. (2) Nutrition: With 57% of Thai preschoolers classified as malnourished, child nutrition continues to be a serious national problem. This report calls for decreasing reliance upon food supplements, with increasing early nutrition surveillance and intervention. Village-level education should focus on improved home food production and purchasing patterns. (3) Village Water Supply: Two-thirds of all Thais obtain their water from open shallow wells. It is recommended that small piped-water systems be established in selected rural villages that lack adequate year-round water. (4) Population: Past efforts to limit population growth have been very successful, but mere continuation of current programs will be insufficient to reach the goal of 1.5% population growth rate by 1986. The RTG should increasingly support the cost of contraceptive supplies, while authorizing and training more health workers who can provide contraceptive services. (5) Integrated Village Services: Two programs, village-level nutrition and piped-water supplies, should be integrated to ensure maximum impact. For example, experience has shown that villagers use piped water to raise home gardens. With nutrition education, families will know which foods to grow to best supplement their diets. Included are a 10-item bibliography (1977–80) and three appendices recommending changes in the RTG Ministry of Public Health data system and detailing the conduct, itinerary, and principal contacts of the consulting team.

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Paper copy $ 8.19 Microfiche $ 1.08

095 **PN-AAJ-357**

AN APPROACH TO PLANNING THE DELIVERY OF HEALTH CARE SERVICES

Kaiser Foundation International; Ghana, Ministry of Health, National Health Planning Unit.
1979, 88 p.

Health Care Services Manual No. 1

Faced with a scarcity of resources, how can developing countries deliver health care services that yield maximum results? The key is planning, the systematic and continuous process of allocating resources to achieve objectives. This "how-to" manual, the first in a series of six publications, is designed to teach the health planning process in a developing country setting, based on the experience of the Ministry of Health of Ghana (MOHG). The first phase in the two-phase planning process is to establish a six-step methodology for the plan: (1) Specify planning objectives, identifying the target group and the approach to be used, i.e., "To plan a rural health care delivery system to extend coverage to 90% of the population of Region X". (2) Define the planning framework, considering all factors that will affect the outcome of the plan, such as a shortage of supplies or lack of government support. (3) Determine the structure for planning, making sure to address the areas of marketing, production, human resources, and finance. (4) Identify those who will participate, trying to include individuals knowledgeable and powerful enough to deal with the problems and see that prescribed actions or decisions are carried out. (5) Identify the data or information needed, specifying how it will be obtained and used. (6) Set a work schedule, stating who will be involved, what is expected of them, and

when they should complete assigned tasks. Once the plan's methodology is established, the second phase begins. In this phase, a three-part process called the "Health Planning and Management Cycle" is used, as follows, to carry out the plan: (1) health assessment, or the collection and analysis of pertinent data followed by the systematic identification of needs and health priorities; (2) programming, which consists of setting objectives, examining various alternatives for achieving them, and establishing a workable plan and budget to carry out the chosen strategy; (3) implementation, or actually carrying out the programs that have been planned. Appended are MOHG exhibits giving examples of the planning process.

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Paper copy $11.44 Microfiche $ 1.08

096 **PN-AAJ-358**

PLANNING AND MANAGEMENT OF HEALTH SERVICES AT THE DISTRICT LEVEL

Kaiser Foundation International; Ghana, Ministry of Health, National Health Planning Unit.
1979, 96 p.

Health Care Services Manual No. 2

Faced with a scarcity of resources, how can developing countries deliver health care services that yield maximum results? The key is planning, the systematic and continuous process of allocating resources to achieve objectives. This "how-to" manual, the second in a series of six publications, is designed to teach health planning at the district level in a developing country setting, based on the experiences of the Ministry of Health of Ghana (MOHG). The three-part "Health Planning and Management Cycle" is described: (1) In the health assessment phase, health data are collected from all major sources such as community studies, birth/death/disease statistics, and population censuses. These data are then analyzed to determine the health status and needs of the people. Next, health/disease problems are identified and prioritized according to their frequency, severity, manageability, degree of community concern, and related political, social, economic, and demographic factors. (2) Health programs are identified for each priority using a six-step method: state program objectives; if program is ongoing, review and evaluate past performance; review changing conditions and new directions; examine alternative schemes; draft an annual work plan specifying what is to be done, when it is to be done, and who is to do it; and obtain commitment and support for implementing the plan. Especially important is the preparation of annual budgets employing all available financial and resource inputs to activate the work plan. For example, a health manager may collaborate with other sectors to use their personnel and equipment in his sewage treatment program. (3) Implementation consists of determining organization, staff, and material requirements for all work plan activities; and directing and supervising staff according to the work plan. "Ten commandments" are given to help supervisors effectively communicate, delegate, motivate, and enrich. Finally, a four-step continuous cycle of evaluation is set up (establish standards; observe performance; compare performance with standards; and take corrective action). Appended are MOHG exhibits, worksheets, and notes illustrating the planning and management process.

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097 **PN-AAJ-381**

HEALTH IMPACT GUIDELINES FOR THE DESIGN OF DEVELOPMENT PROJECTS IN THE SAHEL; VOLUME I, SECTOR-SPECIFIC REVIEWS AND METHODOLOGY

Barbiero, V.
Family Health Care, Inc.
1979, 133 p.

A new rural road improves mobility, communication, and levels of living, but it can also increase traffic accidents, transmit disease, and damage nearby farms and pastures. Such is the dual nature of development—desirable outcomes may have undesirable side-effects. This report, the first of two volumes, outlines the environmental and health impacts that can occur in development in the Sahel and suggests measures to limit their effect. Rainfed and irrigated agriculture can increase population density and the concentration of toxic substances in soil, plants, and human tissue and can cause a dramatic rise in the incidence of waterborne diseases (e.g., schistosomiasis, malaria) and communicable diseases. Livestock development, aimed at preserving pastureland and establishing optimal herd size, can increase the spread of zoonotic diseases such as brucellosis and anthrax to the human population. Because cattle need continuous supplies of water, the incidence of waterborne diseases may also increase. Fisheries provide breeding habitats for mosquitoes, snails, and crustaceans and thus contribute to the spread of waterborne diseases. As people migrate to areas with fisheries, population density also rises. Construction of roads, railroads, and airstrips can damage agricultural and livestock production by altering the patterns of drainage and vegetation on surrounding land. Roadside towns become overpopulated, forcing people to compete for limited supplies of food, water, waste disposal, employment, etc. Any approach taken to combat the negative impacts of development must embody technology that is feasible, affordable, maintainable, understandable, effective, and suited to the needs and resources of its users. The report suggests a decisionmaking process of recognizing a need, identifying alternative solutions, foreseeing possible consequences, weighing the options, making an informed choice, implementing that choice, and making needed adjustments. A suggested checklist to use in assessing a project's impact and choosing appropriate interventions is given. Suggested readings on

agriculture, livestock, fisheries, transportation, disease, and special issues in development are included.

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098 PN-AAJ-382

HEALTH IMPACT GUIDELINES FOR THE DESIGN OF DEVELOPMENT PROJECTS IN THE SAHEL; VOL. II, REFERENCE MANUAL

Barbiero, V.
Family Health Care, Inc.
1979, 206 p.

In the Sahel, as elsewhere in the world, a basic assumption of development efforts is that the downward spiral between disease, poor nutrition, population growth, and economic stagnation can be reversed and the quality of life improved. However, in the Sahel, despite large-scale efforts to eradicate or control diseases and provide health services to the population, the incidence and pattern of disease have changed little over the past several decades. This report, a reference manual accompanying a volume of sector-specific analyses, profiles the major diseases afflicting the Sahel. The Sahelian ecosystem and the six major groups of disease-causing organisms—protozoa, helminths, bacteria, viruses, spirochetes, and rickettsia are briefly discussed. The report then outlines the four modes of disease transmission: (1) by water which is contaminated by urine or feces from an infected person; (2) by food contaminated by dirty hands, mouth or nasal discharges, or human waste products; (3) direct contact in which the organism enters the body directly from the soil or air, or penetrates the skin via wounds, insect/animal bites, or sexual intercourse; and (4) by vector, in which case the disease-causing organism develops or multiplies within a second organism which then infects humans. The following diseases are summarized: malaria, schistosomiasis, onchocerciasis, trypanosomiasis, dracontiasis, dysenteries, measles, tuberculosis, pneumonia, poliomyelitis, trachoma, cerebrospinal meningitis, syphilis, gonorrhea, yaws, hepatitis A, nutritional deficiencies (marasmus, kwashiorkor, xerophthalmia, goitre, scurvy, pellagra, etc.), anthrax, brucellosis, bovine tuberculosis, and leptospirosis. Each entry includes a review page detailing the disease name, causative agent, vector, mode of transmission, symptoms, time of onset, groups at risk, prevention, and treatment. A glossary of terms, a 273-item bibliography (1949–79), and the names and addresses of sources of information and assistance regarding the Sahel are appended.

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Paper copy $26.78 Microfiche $ 3.24

099 PN-AAJ-536

POSSIBLE DISINFECTION OF ORAL REHYDRATION SOLUTIONS

Cash, R.; Chen, L.
Camp Dresser and McKee, Inc.
1980, 16 p.

Prepared by the Water and Sanitation for Health (WASH) Project, Coordination and Information Center

Because people in developing countries are frequently forced to use contaminated water in preparing the oral rehydration solutions (ORS) used to combat the effects of diarrhea, the question has been raised whether and how ORS's can be disinfected. This report summarizes the results of a meeting held by A.I.D. health personnel with consultants to discuss this question. Studies have documented a significant presence of *Escherichia coli* in ORS's of varying water quality. It is not known, however, whether drinking contaminated ORS results in reinfection or in prolongation of the diarrheal episode or at what point the ORS usually becomes contaminated. If it is assumed that contamination comes from the water itself, several options for disinfection exist: adding a bactericidal agent to home water storage vessels, boiling the water, exposing the mixed ORS to the sun's ultraviolet rays, or adding a disinfectant to ORS packages. In reference to the latter, the consultants suggested that further research be undertaken to answer such questions as what disinfectants would: Have a high bactericidal/viricidal activity? Be relatively inert with regard to the ORS components? Not decrease the shelf-life of ORS packages? Be palatable? Be of low cost? Be chemically inert with metal ions often found in untreated water? Not adversely affect the inflamed gut? It was also asked whether adding a disinfectant to ORS packages might not spur a movement to add supplemental vitamins, minerals, and proteins and whether the costs of adding disinfectants might not be better used, e.g., in improving public knowledge of ORS or in helping countries produce their own ORS packages. After discussions on alternatives to water purification strategy, e.g., reducing the size of the ORS package, and on the basic relation between drinking water and health, the meeting ended with a general agreement that, pending the results of further research, disinfectants should not be included in ORS packages at this time. Lists of meeting participants and of further research questions are attached, along with a report on the effectiveness of disinfection of ORS by sunlight and a brief description on methods of disinfecting ORS's.

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Paper copy $ 2.08 Microfiche $ 1.08

100 PN-AAJ-638

GUATEMALA'S RURAL HEALTH PARAPROFESSIONALS

Colburn, F.D.
Cornell University, Center for International Studies, Rural Development Committee.
1981, 61 p.

Special Series on Paraprofessionals No. 2

To redress the frequent bias of developing country health care systems toward providing high-cost, professional, curative care in urban areas to the neglect of delivering basic health care services in isolated rural areas, paraprofessional health workers are being increasingly used to serve the rural poor. This field study, one of six conducted by Cornell University, reviews the effectiveness of paraprofessionals in rural Guatemala. The origin and development of Guatemala's health paraprofessional program and its implementation in eight villages are reviewed. Despite stiff (and continuing) opposition from the physician-dominated health care community, the Guatemalan Ministry of Public Health and Social Assistance (MOPHSA) created two new layers of auxiliary health personnel to serve the rural poor—village health promoters and Rural Health Technicians (RHT). Promoters are village volunteers who receive one month of non-technical training, mainly in preventive health care. RHT's are full-time MOPHSA outreach workers who receive 2 years of technical training. Obstacles faced by paraprofessionals in their work included rampant poverty, fatalistic attitudes, and disrespect by villagers. Promoters in particular suffered from scarce resources and a lack of supervision by RHT's. Political fears of promoting community organizations or of being called "communists", as happened to at least one health promoter, also hamper promoter effectiveness. Approximately half of the promoters no longer practice due to lack of compensation or encouragement. The evidence suggests, nevertheless, that the paraprofessional program has brought health care to previously deprived areas (although evidence of illness or death declines is lacking) and that health promoters in particular have promoted community organization and are now providing limited curative care. In conclusion, the author discusses three ways to improve program effectiveness: increasing the resources available to promoters and their supervision by RHT's and improving cooperation between employees—paid or not—of concerned Guatemalan ministries. A 10-item bibliography (1974–79) in English and Spanish and a health promoter's newsletter in Spanish are appended.

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Paper copy $ 7.93 Microfiche $ 1.08

101 PN-AAJ-703

RELATIONSHIPS OF RURAL DEVELOPMENT STRATEGIES TO HEALTH AND NUTRITIONAL STATUS: CONSEQUENCES FOR FERTILITY; A STATE-OF-THE-ART PAPER

Isely, R.B.; Zivetz, L.; Norman, R.; Banatte, H.
Research Triangle Institute; South East Consortium for International Development.
1979, 93 p.

Knowledge of the health and nutrition effects of different rural development strategies on maternal health and fertility is critical to sound development planning. This report, one in a series of seven state-of-the-art papers prepared for A.I.D.'s Rural Development and Fertility Project, analyzes the link between rural development strategies and fertility indicators. Health status, particularly that of mothers and children, is treated as an intermediate variable. The relation of maternal health and child survival to fertility is detailed, with specific reference to the three aspects of reproduction—intercourse, conception, and outcome of gestation. While maternal health influences the possibility of conception and the outcome of pregnancy, child survival affects frequency of intercourse and, therefore, likelihood of conception. Further analysis is made of the three determinants of maternal health: nutrition (as influenced by food availability, health practices, and income); the incidence of infectious disease (as affected by environmental quality and health attitudes/practices); and use of health services (as influenced by health service management and personnel, health attitudes and practices, income, and community social structure). Three development strategies—those focusing, respectively, on participatory development, agricultural production, and increased income—are then studied and compared for their impact on the above-mentioned determinants. The report concludes that: (1) In programs geared to promoting community participation, success depends on the distribution of benefits, attention to food production, and incorporation of health, nutrition, and family planning components. (2) Programs aiming to raise agricultural production and productivity are more successful in improving maternal health when taking into account the entire spectrum of agricultural production rather than a single subsector. (3) Unless food and services are equitably distributed, programs to increase income are of only limited value in improving health status. A 28-item annotated bibliography (1962–79) and a 130-item general bibliography (1945–79) are appended.

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Paper copy $12.09 Microfiche $ 1.08

102 PN-AAH-737

LESOTHO SHELTER SECTOR ASSESSMENT

DeVoy, R.S.
DeVoy Collaborative.
1978, 133 p.

Under its Second Five-Year Development Plan (1975–80), the Government of Lesotho (GOL) will seek to redress the country's severe housing shortage by constructing 9,000 housing units. This shelter sector assessment was prepared in response to a GOL request for A.I.D. assistance in developing a national housing policy to guide this effort. The greatest constraints to past housing projects in Lesotho have been their high cost in relation to income, lack of a centralized GOL housing agency, an undeveloped private housing market, and lack of donors. Construction costs have been high due to a shortage of building materials in urban areas and the migration of management personnel and skilled workers to South Africa. Construction has been largely carried out informally (formal construction being contracted exclusively by the GOL and parastatals), using self-help, hired skilled labor, and traditional building materials. Under its current 5-year plan, the GOL will invest Rand 5.93 million in housing, much of it from external sources, create a national housing policy, establish a housing finance institution serving all income groups (the Lesotho Building Finance Corporation—BFC), and increase low-income housing. This is the GOL's first commitment to housing (aside from civil servant and expatriate housing), although the program's financial disbursement still favors higher income groups. Households earning over R100 per month are likely to pay 25% of their income to become homeowners while low-income groups should be able to make a 10% down payment. The passage of the 1973 Land Act, the authorization of BFC, and two bills currently being considered are increasing the GOL's powers for development regulation, financing, and urban planning. Recommendations for a new national housing policy include: (1) use available resources; (2) ensure housing investments are efficient and equitable; (3) increase and not simply replace the housing stock; (4) increase options rather than provide standard housing solutions; (5) be explicitly concerned with all income groups; (6) maximize use of private capital; and (7) minimize subsidies. Annexes include the study's information sources and a list of those interviewed.

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Paper copy $17.29 Microfiche $ 2.16

103 PN-AAH-739

BOTSWANA SHELTER SECTOR ASSESSMENT

Devoy, R.S.
Devoy Collaborative.
1979, 157 p.

In view of the estimated 45,000 new housing plots needed by 1985 in the four towns—Gaborone, Selebi-Pikwe, Francistown, and Lobatse—where Botswana's high urban growth rate, perhaps the highest in Africa, is concentrated, the Government of Botswana (GOB) requested this AID-financed housing sector assessment. The report covers Botswana's housing needs and GOB housing plans, urban housing patterns, land tenure and planning, housing institutions, the construction sector, and related topics such as refugee settlements. To meet increasing housing needs, the GOB will introduce integrated urban and rural development and place greater stress on sites-and-services self-help housing (and provide loans to plotholders to build the permanent houses now required of them); and increase substantially its already notable (unofficial) subsidies to finance services for the expensive housing pattern (single-family detached housing) most prevalent in the four key towns. Botswana's current lack of the management and supervisory skills needed for an expanded and sophisticated housing program should not retard the growth of self-help construction which requires less skilled craftsmen. One of the most difficult issues with regard to low-cost housing is the development of suitable sanitation systems; waterborne sewerage is too expensive and uses too much water. Despite these problems, the GOB and the Town Councils are making headway in meeting the nation's housing needs. The report's main recommendation is that the GOB should aggressively pursue its present policies. Recommendations to strengthen various GOB agencies are also made, with emphasis on improving the pace and effectiveness of the Department of Town and Regional Planning development plans to avoid further delays and cost overruns; upgrading the revenue-generating and other capacities of Town Council Self-Help Housing Agencies; and, more generally, increased training of indigenous personnel. Other recommendations include continuing research and demonstration programs regarding indigenous building materials and low-cost sanitation and fostering private construction by such methods as encouraging financial institutions to make construction and mortgage loans.

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104 PN-AAH-786

MANAGEMENT AND TARIFF STUDIES RELATIVE TO WATER/SEWERAGE SYSTEMS; FINAL REPORT: OVERVIEW

Black and Veatch International; A.T. Kearney, Inc.; Sabbour Associates.
1979, 109 p.

Final report consists of Overview, PN-AAH-786; Management Systems, PN-AAH-787 to PN-AAH-793; Tariffs, PN-AAH-802 and PN-AAH-803; Inventory and Valuation, PN-AAH-794 to PN-AAH-801

To improve services to their respective communities, the Egyptian water/sewerage utilities must improve their operations and management. To this end, two U.S. firms were contracted to carry out a series of nine management systems studies. This

overview summarizes the major conclusions and recommendations of these studies. The Egyptian agencies under study included the Alexandria Water General Authority (AWGA), the General Organization for Greater Cairo Water Supply, the General Organization for Sewerage and Sanitary Drainage, and the Suez Canal Authority. A report on management procedures of the AWGA (equally applicable to the other utilities) identified significant external constraints to effective management, particularly compliance with the labor law; as well as deficiencies in key management practices such as failure to plan and to delegate authority effectively. A report on the organization and structure of the agencies as a whole pointed to a number of problems: an inabiltiy to retain key personnel because of noncompetitive wages and benefits; a lack of operational autonomy; inadequate policy guidance on key issues such as conservation, coordination of water and sewerage projects, balances between personnel, operations and maintenance, and projects; and severe management shortcomings. A report on the utilities' physical assets found them to be only marginally acceptable. A report on management information systems recommended the following actions: periodic reporting from responsibility centers; revisions in the budgeting, accounting and data collection systems; and development of an information system for top management. The report on data processing suggests a single computer be obtained to serve all the utilities. In another report, procedures and methods in relation to project planning, operation and maintenance, billing and collection, procurement and inventory control, and mapping and record-keeping were reviewed. It was concluded that there is almost no control over those areas. In addition, a report was prepared on human resources management, and an organization manual was issued outlining organization charts for each utility. Executive summaries from each report are appended.

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105 PN-AAH-788

MANAGEMENT AND TARIFF STUDIES RELATIVE TO WATER/SEWERAGE SYSTEMS; FINAL REPORT: MANAGEMENT SYSTEMS—MANAGEMENT INFORMATION SYSTEMS

Black and Veatch International; A.T. Kearney, Inc.; Sabbour Associates.
1979, 114 p.

Final report consists of Overview, PN-AAH-786; Management Systems, PN-AAH-787 to PN-AAH-793; Tariffs, PN-AAH-802 and PN-AAH-803; Inventory and Valuation, PN-AAH-794 to PN-AAH-801

To assist the Government of Egypt improve its water/sewerage services, this report reviews the management information systems of Egyptian utility agencies. The report, one of a series on the management practices and tariff structures employed by these agencies, focuses on budgeting, capital programming, accounting systems, and information for planning and financial control. The agencies studied are the Alexandria Water General Authority, the General Sewerage and Sanitary Drainage, and the Suez Canal Authority. The budgeting system currently used to obtain funds from the central government cannot provide adequate control, since the allocation of expenses is not decided, nor the timing of expenses estimated, nor the need for expenses presented. Moreover, due to the lack of a well-defined process for planning capital programs, the agencies have failed to meet customer needs. Furthermore, the accounting systems currently used by these agencies do not provide useful internal cost and productivity information, while existing information systems neither provide sufficient and timely information needed for efficient planning, nor communicate the goals and plans of the respective organizations, nor focus attention on important decisions managers must make. Recommendations are made to improve each of the above areas. These include: (1) establish budgeting responsibility centers with separate budgets and insist that budget requests be made on the basis of need; (2) develop long-range capital programming plans and an annual capital budget (in addition to a project budget), prepare detailed analyses of the tasks for each major project, and have all major operating and staff departments submit regular progress reports; (3) develop new, streamlined accounting systems which give operations managers and supervisors greater responsibility for controlling costs, provide data to evaluate departmental performance, and permit the gradual introduction of electronic data processing; and (4) prepare a comprehensive set of management reports, containing both financial and operating information, for each major operating and staff department. Numerous exhibits and appendices relating to budget and accounting reports are included.

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106 PN-AAH-793

MANAGEMENT AND TARIFF STUDIES RELATIVE TO WATER/SEWERAGE SYSTEMS; FINAL REPORT: MANAGEMENT SYSTEMS—PHYSICAL ASSETS

Black and Veatch International; A.T. Kearney, Inc.; Sabbour Associates.
1979, 130 p.

Final report consists of Overview, PN-AAH-786; Management Systems, PN-AAH-787 to PN-AAH-793; Tariffs, PN-AAH-802 and PN-AAH-803; Inventory and Valuation, PN-AAH-794 to PN-AAH-801

To improve services to their communities, the Egyptian agencies responsible for water/sewerage services must improve their operations and management. To assist these agencies, two U.S. consulting firms were contracted to carry out a series of management studies. This report documents findings and recommendations regarding the agencies' management of physical assets (buildings and offices, warehouses and storage yards, office supplies and equipment, supplies and equipment

for operations and maintenance, and communications and transportation equipment). The agencies studied were the Alexandria Water General Authority, the General Organization for Greater Cairo Water Supply, the General Organization for Sewerage and Sanitary Drainage, and the Suez Canal Authority. The review covered recordkeeping, preventive maintenance, decisionmaking regarding repair versus replacement, and acquisition and disposal practices. Except for communications equipment, which is inadequate, the assets of the utilities permit marginally acceptable service. However, many improvements can and should be made. Major recommendations include: (1) install a real property inventory system; (2) increase emphasis on preventive maintenance of physical plants and other assets; (3) upgrade plant and local work conditions; (4) increase accountability of managers for property under their control; (5) conduct surveys to determine equipment needs and identify excess and salvage property; (6) create a mechanism for decisionmaking based on the costs of equipment repair versus replacement; (7) gradually replace outmoded office supplies and equipment; (8) install two-way radio systems in the operating departments to enable the agencies to provide more efficient service; (9) establish technical libraries at operating plants and laboratories; and (10) provide tools and shop facilities to improve operations and maintenance, and obtain tools and equipment recommended in engineering consultant studies. Outline descriptions of numbers 1, 2, 3, 6, and 7 are included in the report. The cost of additional physical assets required by the utilities during the next 10 years is estimated at LE 103 million. These costs are detailed in an appendix to the report.

263002500

Paper copy $16.90 Microfiche $ 2.16

107 PN-AAJ-277

ZIMBABWE SHELTER SECTOR ASSESSMENT

Wright, J.; Oakley, D.; Baker, L.
Planning and Development Collaborative (PADCO), Inc.
1981, 104 p.

Technical Appendices: PN-AAJ-278, 179 p.

Zimbabwe's black urban population is growing at an annual rate of 5.7% and will require 17,800–51,700 new housing units per year, well above the 11,600 units constructed by the Government of Zimbabwe (GOZ) in 1978. It is the GOZ's predicament and the overall urban shelter sector which are the subjects of this report. Zimbabwe's urban houses are mainly semi-detached block units costing U.S. $1,200–1,900. Most are concentrated in Salisbury and Bulawayo and are owned by local governments. The Ministry of Local Government and Housing (MLGH) and its Housing Development Services Bureau (HDSB) oversee urban shelter development. Projects are initiated by local authorities; the MLGH approves plans and empowers localities to borrow. Because of the civil war, the GOZ has undergone structural and functional changes that have constrained its ability to plan, research, and evaluate housing projects. The MLGH 5-Year Program has been a step in the right direction, but housing standards are not designed to yield a range of units for different income groups; labor-intensive technology is not promoted; public land acquisition is time-consuming; infrastructure standards are unrealistic; engineers, planners, architects, craftsmen, and developers are in short supply; and formal mechanisms to accumulate savings and channel credit to borrowers do not exist. The report recommends that: (1) a series of interrelated projects be created to meet emerging housing demands; (2) higher-density housing be built in Salisbury; (3) the HDSB act as a shelter developer with localities being responsible for follow-on projects; (4) the HDSB's role as advisor to local authorities be expanded and comprehensive project planning be linked to local interests and resources; (5) the HDSB initiate an aided self-help program and test it with the assistance of Salisbury Municipality; (6) a comprehensive manpower training program be established for architects, planners, engineers, and surveyors; (7) a project evaluation capability be developed within the HDSB and the Salisbury City Council; and (8) a household savings mobilization and loan study be initiated. Technical Appendices (PN-AAJ-278) accompany the report.

Paper copy $13.52 Microfiche $ 2.16

108 PN-AAJ-372

HOUSING SURVEY FOR DISASTER RELIEF AND PREPAREDNESS: LATIN AMERICA

Evaluation Technologies, Inc.
1981, 152 p.

When natural disaster strikes, it is the poor who are most likely affected and least able to recover without assistance. This disheartening fact provides the focus of this concise yet comprehensive profile of the Latin American housing sector aimed at assisting U.S. development organizations in planning relief operations and permanent housing assistance programs. The report's first section characterizes current housing and settlement patterns, construction techniques and materials, funding for low-cost housing, and the kinds of emergency shelter provided in the past for 10 Latin American countries which are prone to natural disasters and frequent recipients of U.S. relief: Bolivia, Chile, the Dominican Republic, Ecuador, El Salvador, Guatamala, Haiti, Honduras, Nicaragua, and Peru. The second part discusses disaster mitigation techniques in earthquake and wind-resistant housing. A characteristic found in all countries is the inadequacy of both urban and rural housing, due mainly to high rates of urbanization and insufficient provision of public services, such as water, electricity, and sewage. Included are figures on the widespread damage to existing housing and infrastructure facilities by tropical storms, earthquakes, and tornados over the past 20 years, e.g., the 1972 earthquake that destroyed 45% of Nicaragua's housing stock. Despite the existence of low-income housing policies

and local credit institutions in most countries, frequent government turnover and the lack of sufficient funds have rendered ineffective most nascent efforts at increasing availability of low-income housing. The housing situation for the poor as presented by such characterizations is grim, and the challenges faced by relief agencies in time of disaster are monumental. The authors do express hope, however, that natural disasters can by mitigated by recommending use of low-cost construction techniques—strong foundations, reinforced load-bearing walls, light-weight roofing materials—which are resistant to earthquakes and hurricanes. Foresight in choosing building sites, configurations of roofs and placement of doors, windows, and air vents to combat wind damage is also urged. A 13-item bibliography (1974–80) is appended.

AID/SOD-PDC-C-0283

Paper copy $19.76 Microfiche $ 2.16

109 **PN-AAJ-389**

HAITI SHELTER SECTOR ASSESSMENT

Robbins, E; Hamman, S.
A.I.D., Bureau for Development Support, Office of Housing.
1980, 59 p.

Most Haitians live in substandard shelter unconnected to water and sewer services, a situation which is particularly acute in burgeoning urban areas such as Port-au-Prince. Such are the country's basic shelter conditions according to this 1980 AID-supported sector study. After assessing socioeconomic factors such as migration, income, employment, and expenditure and savings patterns which impact on a national shelter policy and describing shelter conditions among the poor, the shelter delivery system is analyzed technically (land controls/prices, water and sewerage infrastructure, environmental conditions, and available housing stock) and institutionally (shelter policy, Government of Haiti and financial agencies, and A.I.D. strategy). The study concludes that five main constraints exist to upgrading the conditions of the shelter sector: (1) lack of a definitive Government of Haiti (GOH) shelter policy; (2) GOH inability to develop and maintain qualified middle management at its shelter sector agencies; (3) the difficulty of working in low-income areas which generally have a high population density and are located on hilly or swampy terrain; (4) absence of experienced private shelter institutions; and (5) insufficient mortgage financing. Strategies to improve shelter sector conditions should build upon current initiatives by GOH and foreign agencies to initiate land title registration and land planning procedures, e.g., by extending them to urban areas, and will require a joint GOH/private sector initiative to develop a national capital base for shelter programs. Improvement of the atmosphere for long-term lending will require a revised tax policy to encourage land sales and home improvements, along with GOH policies to secure lenders' collateral, lower the Central Bank's reserve requirement, and—of key importance—to mobilize savings. Another critical need is for public utilities to recover as high a percentage of their investment as possible in order for infrastructure investment to keep pace with the demand for service. In sum, unless internal resources for increased shelter activity are mobilized, the progress already made in designing and constructing minimal shelter solutions will have less impact.

Paper copy $ 7.67 Microfiche $ 1.08

110 **PN-AAJ-486**

A MARKET SURVEY OF PROTOTYPE CORE HOUSING UNITS IN MAURITIUS

Planning and Development Collaborative International.
1980, 87 p.

Following an AID-sponsored sheltor sector assessment in 1977, the Government of Mauritius decided to replace the subsidized high-standard dwellings used in previous post-cyclone housing reconstruction programs with smaller and more cost-efficient shelter units. Before embarking on a large-scale program, however, a market survey was conducted to determine the acceptability and affordability of the core units among lower-income families. This report analyzes the survey data and presents the implications for a possible A.I.D. Housing Guaranty loan. Two prototype core housing units were built at six demonstration sites throughout the island and the survey was administered to potential occupants, the majority of whom met the below-median income requirements. Principal findings of the survey were that 79% of those wanting a core house need to have the land supplied by the government, 99% would be willing and able to pay for it, 70% were willing to move to occupy a core house (although there was a strong preference to stay in one of the five major urban areas), and Mauritius suffers a shortage of permanent housing given the high percentage of dwellings made from iron or tin. The principal implications of the survey for low-cost shelter projects are: (1) there is ample need and effective demand among the potential target group to justify a Housing Guaranty Program; (2) low-income shelter projects should concentrate on the five principal municipalities; (3) serviced sites should be offered with building loans to those who prefer this option to core houses; (4) the houses should have two small rooms rather than one large room and be sufficiently reinforced to allow for eventual vertical expansion; (5) due to a high percentage of employed respondents, the present system of collecting mortgage loans through salary deduction would be feasible for many low-income households; (6) because the potential beneficiaries include a significant proportion of households headed by women, the legal and social status of women should be taken into account in project design. Appended are designs of prototype core houses and the survey questionnaire.

AID/C-1627 912158900

Paper copy $11.31 Microfiche $ 1.08

111 **PN-AAJ-344**

ENRICHED FOODS FOR PARAGUAY

Crowley, P.R.
U.S. Department of Agriculture, Office of International Cooperation and Development, Nutrition and Agribusiness Group.
1980, 20 p.

To replace wheat imports with locally-produced cereal products and help the urban poor cope with rising food prices, the Government of Paraguay (GOP) has plans to develop, on a pilot basis, inexpensive, protein-enriched processed foods for distribution to low-income, urban populations. To help meet the Inter-American Development Bank's funding requirements for this project, the GOP asked USAID for advice on product and processing alternatives and preplanning of feasibility studies. This paper summarizes the results of USAID's assistance. In light of the GOP's ultimate aim of expanding the project nationally, USAID advised the GOP to incorporate into the project's design steps for a transition from the pilot plant to full-scale, commercial production and distribution activities. Additional project components suggested by USAID were that the foods produced at the pilot plant be evaluated for nutrition and economy; that the suitability of select foods for full-scale processing and distribution be determined; and that training be given to project staff and food technology students. As nutritious substitutes for meat, milk, eggs, and other protein foods in urban poor diets, USAID suggested the following: (1) soybean flour for use in cereal foods; (2) cereal flours derived from local sources of wheat, corn, and mandioca; (3) weaning foods made from blends of rice and soybean flours, vitamins and minerals; (4) fortified/extended bread flour and pasta products made from soybean, rice, and/or mandioca flour; (5) substitute or extended milk products; (6) textured vegetable protein; (7) snacks and breakfast cereals made from corn, rice, soy, and cassava; (8) precooked soup powders with protein supplements; and (9) vitamin and mineral additives. Two alternative project approaches—using existing pilot plants in other Latin American countries rather than developing a pilot plant in Paraguay and processing only one food product to speed up project implementation—were rejected by the GOP as inappropriate to overall project concerns. USAID also submitted to the GOP a list of organizations and individuals capable of assisting in the project's design. A 3-item reference list (1979–80) in English and Spanish is appended.

RS-01-74 931083100
Paper copy $ 2.60 Microfiche $ 1.08

112 **PN-AAJ-346**

DEVELOPMENT OF FOOD FORTIFICATION PROGRAMS

Crowley, P.R.
U.S. Department of Agriculture, Office of Cooperation and Development.
1980, 18 p.

The success of food fortification programs, long considered by international nutritionists to be an important tool in solving developing country nutrition problems, has been less than overwhelming. This paper focuses on steps to foster and accelerate the use of food fortificaton by citing previous programs and suggesting ways to develop new ones. The U.S. Food for Peace program is highlighted as one of the largest food fortification programs in the world and its history is traced from the 1950's to the present. During this period, the program has changed from a simple food distribution program to a nutrition-oriented one, consciously designed to provide maximum benefit to recipients by fortifying foods with protein, vitamins, and minerals. The amounts and kinds of fortificants have changed periodically as program officials have become increasingly aware of recipients' problems. Such was the case in 1965 when powdered milk was fortified with vitamin A for countries where severe blindness and xerophthalmia had been detected. India, Colombia, and other developing countries have food fortification programs of their own in which fortified cereal foods are manufactured locally to fulfill the nutritional needs of the poor. The existence of these programs shows that food fortification is feasible—a practical and applicable technology exists, the foods are acceptable to the recipients, and the programs are affordable. Given widespread acceptability of the food fortification concept and its practicality as shown in several case studies, the author concludes that the major barrier to more extensive application of food fortification is the lack of a practical and effective set of implementation guidelines. He suggests that, in designing fortification programs, clear and specific objectives be defined and disseminated among decisionmakers; an action plan listing required activities, responsibilities and time frames be created; cost estimates be generated early on and updated periodically; and that contributors to the program be allowed to participate in its planning so they will more likely support its implementation.

RS-01-74 931083100
Paper copy $ 2.34 Microfiche $ 1.08

113 **PN-AAJ-348**

REVIEW OF FEASIBILITY OF ALTERNATIVES FOR THE SCHOOL MILK AND SCHOOL LUNCH FEEDING PROGRAMS IN KENYA

Barrett, F.F.
U.S. Department of Agriculture, Office of International Cooperation and Development.
1980, 25 p.

The Ministry of Basic Education (MBE) of the Government of Kenya is searching for alternatives for two major feeding programs for primary school children—the school milk and lunch feeding programs—in order to minimize costs while maintaining good nutritional quality. This study explores several alternatives to determine which have sufficient potential to warrant further consideration. Regarding the school milk program, MBE officials wanted a suitable alternative form of milk or milk-containing food to supplement the current morning distri-

bution of liquid whole milk to some 3.2 million school children twice a week during the regular school term. One alternative was the use of a whole milk biscuit, a blend of dry whole milk, sucrose, and flavoring that provides the nutrient equivalent of 200 ml of liquid whole milk. Since the biscuit is currently produced in New Zealand, the Ministry requested a feasibility study on production and distribution possibilities in Kenya. It was found that while the overall cost of providing milk biscuits in Kenya was 35.5 cents per unit as opposed to 50–70 cents per unit of whole milk, production would be dependent on unreliable liquid milk supplies; that the costs of in-country production facilities would be high; and that the children's receptivity to eating instead of drinking milk was uncertain. One viable alternative to milk biscuits is that of producing a true biscuit, or cookie, made from wheat and/or maize flour which provides desired levels of whole milk and shortening, increases the children's caloric intake, and costs only 20.9 cents per unit. Regarding the school lunch feeding program, MBE wanted prepared foods which could be centrally processed, were suitable for midday meals in individual schools, and required no cooking at the school level. The major suggestion was the use of low-cost extrusion cookers (LEC) for the central processing of maize and beans. This technology eliminates or greatly reduces the need for real cooking at individual schools, saves fuel and water, and adds a variety of types and flavors to the current midday meal. A process for quick-cooking beans is also described as a way of reducing fuel requirements by reducing cooking time.

RS-01-74 931083100

Paper copy $ 3.25 Microfiche $ 1.08

114 PN-AAJ-379

GUIDELINES FOR THE ERADICATION OF VITAMIN A DEFICIENCY AND XEROPHTHALMIA: VI. RECENT ADVANCES IN THE METABOLISM AND FUNCTION OF VITAMIN A AND THEIR RELATIONSHIP TO APPLIED NUTRITION

De Luca, L.M.; Glover, J.; Heller, J.; Olson, J.A.; Underwood, B.
International Vitamin A Consultative Group.
1978, 46 p.

Vitamin A deficiency, often in association with protein deficiency, is a major nutritional problem among preschool children in many areas of the world. The most notable result of acute vitamin A deficiency is xerophthalmia, in which the surface of the cornea becomes dry and rough, ultimately causing permanent scarring or irreversible loss of sight. This report summarizes the latest findings about the absorption, metabolism, and function of vitamin A and suggests applications of this knowledge to improve vitamin A nutriture. Vitamin A and its provitamins (organic substances, such as carotenoids, which convert to vitamin A when ingested) are provided only through foods; proteins and fats in the diet stimulate their absorption. Technical detail is provided as to how vitamin A and its analogues (retinols) are absorbed into the tissues—including the complex route by which they are absorbed by the eye's retinal and photoreceptor cells—as well as on their storage, transportation, metabolism, and excretion. Vitamin A is an effective promotor of eye mucus production and a preventive agent of various types of chemical carcinogenesis; it can function as an anti-infective, but overdoses have the opposite effect. Determining vitamin A deficiency in children is more difficult than in adults, because of the combination of factors and symptoms often at work in the malnourished child. Dose responses in administering vitamin A to vitamin A-deficient persons vary widely depending upon the degree of deficiency and other external factors; for instance, diseases which affect the pancreas, liver and kidney markedly alter vitamin A needs. Correlations between vitamin A absorption and protein and fat, and between vitamin A deficiency and zinc, iron, and vitamin E deficiencies are shown, with corrective suggestions (increased consumption of eggs and meat; increased consumption of fruit and vegetable preparations containing the appropriate minerals and vitamin A and E equivalents, such as red palm oil, tomato juice, carrot juice, and spinach puree). Since complicated biochemical analyses of vitamin A deficiency are not feasible in the field, simpler methods are suggested, involving tissue samples.

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Paper copy $ 5.98 Microfiche $ 1.08

115 PN-AAJ-482

OVERCOMING WORLD HUNGER: THE CHALLENGE AHEAD—REPORT OF THE PRESIDENTIAL COMMISSION ON WORLD HUNGER

Linowitz, S.M.; Mayer, J.; Muller, S.; et al.
Presidential Commission on World Hunger.
1980, 276 p.

A.I.D. response, "A Strategy for Focusing A.I.D.'s Anti-Hunger Efforts": PN-AAJ-375, 58 p.

Although starvation claims the lives of millions of people throughout the world, famines are localized tragedies; the most pressing global food problem is chronic undernutrition which affects the lives of between 450 million and one billion people every year. Citing these facts, the Presidential Commission on World Hunger urges the United States to reorient its relations with the developing world to make the elimination of world hunger its first priority. Among the Commission's recommendations are that the United States: (1) support price stabilizing and tariff reduction agreements on commodities of particular interest to the developing world; (2) expand the Generalized System of Preferences and put it on a fixed-term, multiyear basis; and (3) expand the President's authority to assist the least developed nations. Under corporate involvement, the Commission recommends that: (1) non-profit organizations and private corporations create a clearinghouse to encourage collaboration between developing nations and U.S. small firms in food

and agriculture; and (2) the United States support United Nations efforts to prescribe investment standards with balanced requirements for both investors and developing countries. For enhanced food security, the United States should press for the establishment of a global system of food and grain reserves and take steps to preserve U.S. farmer-owned reserves for use in international emergencies. Under development assistance the United States should: (1) strengthen the International Cooperation and Development Agency so that its objectives can be more easily integrated into U.S. foreign policy; (2) disburse 0.7% of U.S. GNP as concessional economic assistance; (3) strengthen A.I.D.'s agricultural and managerial competence and use nutrition as an integrating theme in agricultural, health, and family planning programs. Domestically, the United States should: (1) establish a National Nutrition Surveillance Program as a systematic way to assess the nutritional standards of Americans; (2) remove the expenditure limit on federal funding for food stamps and other successful feeding programs; and (3) establish an organization to educate the American public about world hunger.

Paper copy $35.88 Microfiche $ 3.24

The Commission concluded that "...the right to food is the most basic..." of human rights.

116 **PN-AAJ-736**

NUTRITION-FERTILITY INTERACTIONS IN DEVELOPING COUNTRIES: IMPLICATIONS FOR PROGRAM DESIGN

Zeitlin, M.F.; Schlossman, N.P.; Meurer, M.J.; Wray, J.D.; Stanbury, J.B.
Massachusetts Institute of Technology, International Nutrition and International Population Initiatives Programs; Abt Associates, Inc.
1980, 179 p.

While lowering infant mortality decreases fertility, improvements in nutrition increase fertility. It is this apparent conflict, its policy implications, and the physiological and psychological elements of the nutrition-fertility interaction which are the subject of this report. The report examines the contraceptive effects of breastfeeding; good nutrition's impact on breastfeeding (when infants receive food supplements, breastfeeding diminishes, ovulation returns, and fertility increases earleir in well-nourished women); and the effects of uncontrolled fertility on nutritional status and mortality. The report also outlines various psychosocial determinants of family size—replacement, insurance, and investment births—which must be considered in programs to reduce mortality and fertility. Any attempt to maintain a low net reproduction rate through low nutritional status will necessitate high mortality and severe deprivation and will be incompatible with those changes in personal motivation needed for voluntary adoption of the two-child family norm. Modernization entails economic constraints and changing values which combine to encourage fewer children with greater investment per child. The following actions will encourage this process: (1) conveying the message that reducing infant mortality means a couple can achieve desired family size with fewer pregnancies; (2) providing integrated, community-based family planning, health, and nutrition services to complement those existing family planning, nutrition, or primary health care programs which are the most popular, powerful, and rapidly growing; (3) introducing modern methods of birth control soon after each birth, to take advantage of the contraceptive effect of breastfeeding as a back-up while mothers gain familiarity with the new methods; (4) reinforcing modern sector aspirations; (5) encouraging investments in child health, nutrition, and education; (6) promoting parent-child bonding and nucleation of the family, particularly in extended polygynous kinship groups; (7) reducing the social security function of children by establishing programs for the elderly; and (8) expanding women's educational opportunities and participation in the labor force. A 242-item bibliography (1940–80) is appended.

AID-otr-147-79-32

Paper copy $23.27 Microfiche $ 2.16

117 **PN-AAJ-458**

RURAL DEVELOPMENT, HEALTH, MORTALITY, AND FERTILITY IN RURAL NORTHEASTERN TANZANIA

Kocher, J.E.
Harvard Institute for International Development.
1980, 123 p.

To help determine the causes of, and possible relation between, high fertility and high mortality rates in tropical Africa, four rural areas in northeastern Tanzania were surveyed to determine the impact upon fertility and mortality rates of socioeconomic variables such as level of education, economic status, occupation, age at marriage, forms of marriage, place of delivery, breastfeeding practices, and health-related behavior. The survey, the findings of which are analyzed in this report, found that infant and child mortality rates in this area of Tanzania have declined substantially over the past two decades resulting in mortality rates uncommonly low for tropical Africa. Perception of this decline by parents differed widely with level of parent education. Major influences on desired levels of fertility were found to be the mother's age at first and last childbearing and the intervals between births. Women who marry later, generally the more educated, "catch-up" with or surpass women of the same age in fertility due to increased child survival and shorter birth intervals. Once women marry, fertility is determined by breastfeeding practices, sexual abstinence, and to some extent by infant mortality which shortens the interval between births. Of the socioeconomic variables analyzed, only one, "place of delivery" (hospital versus home) was consistently linked positively with lower infant mortality. This variable can be indirectly linked to education, economic status, pregnancy-related medical care, and occupation, although surprisingly, no direct correlations were found between these variables and infant survival. The study also found that a substantial proportion of parents desired to terminate childbearing after rearing five or more surviving children, but this desire could not be linked to educational or economic variables. The study suggests that the key factors promoting low fertility and mortality levels are basic education, especially for girls, and access to basic health care. It is recommended that promotion of family planning practices and immediate and prolonged breastfeeding be incorporated into the latter. A 60-item bibliography (1968–80) is appended.

AID/otr-G-1671 930004900

Paper copy $15.99 Microfiche $ 2.16

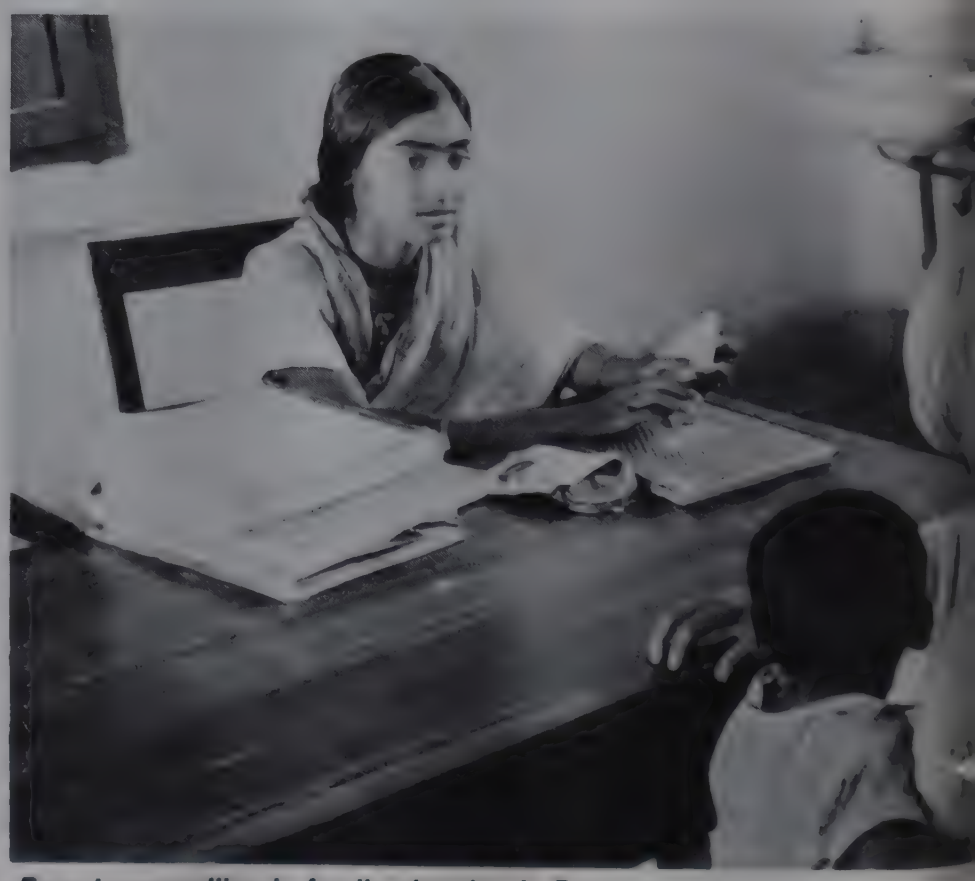
118 **PN-AAJ-513**

ESTIMATION OF RECENT TRENDS IN FERTILITY AND MORTALITY IN BANGLADESH

National Research Council, Committee on Population and Demography.
1981, 133 p

Committee on Population and Demography Report No. 5

Although Bangladesh—with 88 million people living on 144,000 sq. km. in 1979—is one of the world's most densely populated countries, reliable population statistics needed to accurately predict demographic trends are lacking. This report estimates data and trends in (1) fertility; (2) mortality; (3) marital status; (4) regional variations; and (5) natural increase from 1960 to 1975. Estimation is difficult because vital events are not routinely registered; censuses are unreliable, and population shocks (e.g., natural disasters, Hindu migration) have occurred. Estimates of fertility vary widely depending on which technique is used, but a figure in the range of 6.8–7.3 births per 1,000 is likely. Aside from a slight decrease in fertility brought on by late marriages, no general trend in fertility is evident for the period. The incidence of widowhood has declined at a fairly rapid rate and probably caused a small increase in fertility. The age of first marriage rose 1.5 years for both men and women. Mortality information for Bangladesh consists of indicators which reflect but do not measure mortality and data derived from sample surveys. Infant mortality fluctuated between 130 and 160 per 1,000 from the late 1950's to 1975, with child mortality (ages 1–4 years) somewhat higher than infant mortality; despite year-to-year variations, no underlying trend was evidenced. Adult mortality was 18 per 1,000 in the mid-1960's; 17 per 1,000 in the mid-1970's. In terms of overall mortality, between 1964–65 and 1973–74, life expectancy at birth rose from 48.6 to 51.6 years for men and from 47.6 to 49.6 years for women. In terms of regional differences, fertility was highest in Rajshahi, followed by Khulna and Dacca, and lowest in Chittagong. Child mortality did not appear to vary by region. Although definitive estimates are not possible, it is likely that population growth increased between 1964 and 1974, primarily due to the drop in adult mortality. It is also probable that the female population grew



Parent counselling in family planning in Dacca.

faster (2.9–3.2%) than the male population (2.8–3.0%). A glossary of terms and a 51-item bibliography (1949–81) are appended.

AID/DSPE-G-0061 932064300

Paper copy $17.29 Microfiche $ 2.16

119 **PN-AAJ-514**

AGE MISREPORTING AND AGE-SELECTIVE UNDERENUMERATION: SOURCES, PATTERNS, AND CONSEQUENCES FOR DEMOGRAPHIC ANALYSIS

Ewbank, D.C.
National Research Council, Committee on Population and Demography.
1981, 125 p.

Committee on Population and Demography Report No. 4

Although demographers are resigned to age distributions being distorted by respondent ignorance, proxy reporting, poor questionnaires, faulty age estimation techniques, interviewer bias, and data processing errors, they must still account for these distortions in their work. This report reviews several studies on age misreporting (AM) and underenumeration (UE) conducted in Paraguay, Nigeria, South Korea, and other developing countries during 1966–80. Distortions due to AM or to UE can be detected by reinterviewing, checking data against other sources, examining distributions for unexpected differences, or comparing age distribution in different censuses. These techniques, of which historical event calendars, post-enumeration surveys, and stable population and census survival techniques are representative, are analyzed in terms of their underlying assumptions and ability to detect errors. Studies have shown distortions to fall into two broad patterns, the African/South Asian pattern, characterized by unidirectional AM over a broad range, and the Latin American pattern, marked by pronounced age heaping by single years with 5-year distributions tending to alternate excesses and deficits. The report concludes that: (1) questionnaires should reflect awareness of cultural factors and not require interviewers to perform arithmetic in the field; (2) the quality of age reporting depends strongly on the interviewer's education and experience; (3) local calendars of historical events are a waste of time and money; (4) more attention should be given to ensure or estimate the completeness of census counts; (5) published AM and UE studies rarely provide information needed to understand sources of errors or their importance; (6) stable population analysis and census survival approaches should receive greater use and study; (7) studies with moderate sample size which match age reports to other documents can produce valuable results; and (8) future simulation studies should compare alternative patterns of age reporting and use alternative age groupings from single year distributions. Numerous statistical tables, a glossary of terms, and an 89-item bibliography (1953–81) are included.

AID/DSPE-G-0061 932064300

Paper copy $16.25 Microfiche $ 2.16

120 **PN-AAH-916**

ECONOMIC AND SOCIAL BENEFITS OF FAMILY PLANNING IN GUATEMALA

Horlacher, David E.
American Public Health Association, International Health Programs.
1979, 100 p.

Guatemala's national family planning (FP) program is aimed at reducing the country's fertility rate to avoid a doubling of the population from seven million to 14 million by the year 2000 and a consequent shackling of the country's ambitious development plan. This report assesses, for development planners, the favorable social and economic benefits of a successful FP program. After comparing Guatemalan demographics with other countries in the region, the report identifies development planning goals which can be served by increased FP activity along with the differential impact on the attainment of economic and social goals of four alternative projections of reductions in the total fertility rate (TFR). A final section calculates the costs of achieving alternative fertility levels and develops cost/benefit comparisons of the population projections considered in the preceding sections. The study concludes that a reduction in TFR from 5.9 to 3.2 by the year 2000 will have the following predictable consequences: (1) income and arable land per capita will increase 28%; (2) the demographic and economic dependency ratios will be reduced, respectively, from 98/100 to 63/100 and from 272/1000 to 203/1000; (3) the government will save 32 million quetzals (Q) on health care programs and 104 million Q on social services as a whole; (4) capital per worker will increase 6%; (5) only 160,000 new jobs will be required to maintain current levels of unemployment, the capital

cost of which to maintain will require 1.7 million fewer Q than at present, 2.4 million fewer Q if female labor force participation rates increase 50%; (6) 353,000 fewer new housing units will be needed, at a saving of 1.76 million Q; (7) the number of primary school age children will be reduced to 712,000, requiring 16,400 fewer new primary grade teachers, while the number of children not receiving primary education will be reduced from 1.2 million to 730,000; (8) 3,642 fewer new doctors and 769 fewer new nurses will be needed to maintain current ratios of doctors and nurses per person; and (9) medical care at birth will be reduced 31%. These findings clearly support the decision to provide integrated FP services in Guatemala.

AID/DSPE-C-0053

Paper copy $13.00 Microfiche $ 2.16

121 **PN-AAJ-557**

FAMILY PLANNING: ITS IMPACT ON THE HEALTH OF WOMEN AND CHILDREN

Maine, D.
Columbia University, College of Physicians and Surgeons, The Center For Population and Family Health.
1981, 56 p.

The enormity of the maternal/child health problems facing developing countries is evident from the fact that two-thirds of their people are either children under 15 or women of childbearing age. This report explores how family planning (FP) can help avoid or reduce some of these problems. Using research data from 37 developing and developed countries, the author shows that a child's chances of surviving the first few years of life are reduced if children are born close together in time; the family already has three or more children; and the mother is under 20 or over 35. For example, in India, Lebanon, the Philippines, and Turkey, child mortality rates are highest for those born less than a year since their mother's last birth. Under the same conditions, the mother is also at significantly higher risk of incurring complications such as hemorrhage, pulmonary embolism, toxemia, or even death. Moreover, many of the estimated 15–25 million annual illegal abortions end in complications or death because dangerous traditional methods such as "massaging" the abdomen or inserting toxic herbs or sharp sticks into the uterus are used. When women have access to FP information and methods, a great number choose not to have large families, closely-spaced births, and births at unfavorable ages. For example, in Chile between 1962 and 1978, the proportion of third or later births declined sharply, with the largest drops among females under 15 or over 30—with a consequent drop in the number of fatal illegal abortions. In the United States, abortion now causes less than one death per million in women aged 15–44 as compared to 10–85 deaths per million in developing countries. Since the mid–1960's, when organized FP programs began in many developing countries, over 34% of women of childbearing age are using some form of contraception. However, because they lack easy access to contraceptive supplies and/or information, nearly half use inefficient methods (such as withdrawal, rhythm, or douching) or fear using modern methods such as the pill or IUD. The author recommends continuing and expanding FP programs in developing countries. An 87-item bibliography (1938–81) in English and Spanish is appended.

AID/DSPE-CA-0043 932063200

Paper copy $ 7.28 Microfiche $ 1.08

122 **PN-AAJ-630**

RURAL DEVELOPMENT INTERVENTIONS AND THEIR IMPACTS ON FERTILITY: STATE-OF-THE-ART PAPERS

David, A.S.; Levine, W.T.; Vickery, E.; Zivetz, L.
Research Triangle Institution; South-East Consortium for International Development.
1979, 105 p.

Rural Development and Fertility Project

To increase its ability to build antifertility strategies into rural development programs (RDP's), A.I.D. sponsored a series of state-of-the-art papers on the impact of RDP's on fertility decisions. This report presents executive summaries of these papers, along with a framework for synthesizing their key findings. The papers treat, in order, the fertility impact of RDP's that focus on women's roles; education; urban-rural migration; the cost/value of children; land tenure; income; and health/nutrition. Each paper includes an annotated bibliography of pertinent literature, an inventory and fertility-related analysis of hypotheses found in the literature, and an executive summary. Based on the fact that all the studies agree that fertility decisions and other decisions to allocate time and money are interdependent and that rural development programs rarely affect fertility decisions directly, a general model identifying linkages between household decisions and external influences on fertility is presented. Two sets of decisions directly affecting fertility are desired family size and the spacing of births (D1) and contraceptive use and age at first marriage (D2). Both sets are affected by income, the price of goods and services, household variables (e.g., age, religion), and local and national environments; and by household decisions regarding resource allocation in the areas treated in the seven studies. Externally, D1 and D2 decisions are mainly affected, respectively, by economic and social/environmental factors. Decisions for fertility imply decisions for child education and for maternal/child health and nutrition. Decisions for adult quality of life and thus against fertility are most often decisions for durables and savings, additional woman's education, off-farm employment of women, and migration to cities. All of these factors can be indirectly influenced by RDP's. Six RDP categories, i.e., self-help, social service extension, marketing systems, area development, financial markets, and off-farm employment, are discussed in this context. For example, building a school through self-help efforts will increase a local child's education, in turn reducing the child's future desire for a large family.

AID/ta-CA-1 931117000

Paper copy $13.65 Microfiche $ 2.16

123 **PN-AAJ-292**

SOLAR COOKERS: TEST RESULTS AND NEW DESIGNS

Bowman, T.E.
Florida Institute of Technology, Center for Research on Energy Alternatives.
1978, 30 p.

Prepared for presentation at the Second International Symposium of Engineering, "Technology Appropriate to Underdeveloped Countries," San Salvador, 1979

The availability of fuel for cooking has become a major problem in many developing countries. Increased use of charcoal made from native wood can cause deforestation and loss of agricultural land, and most developing countries lack the fuel distribution system necessary for the use of kerosene, gasoline, or liquified petroleum gas. Solar energy, by contrast, is abundant and available. This paper reports on a program to design, fabricate, test, and evaluate solar cookers for possible use as the primary means of cooking by rural families in developing areas. Four Telkes ovens, two Adams cookers, three direct-focusing cookers, two steam cookers, and three combined focusing/oven cookers were tested. These included cookers which were designed by the authors, purchased, or modified/copied from earlier designs. The cookers were evaluated in terms of time to boil three liters of water, maximum temperature of vegetable oil, energy storage, capacity, versatility, ease of use, ease of maintenance, durability, wind stability, portability, materials cost, and ease of manufacture. It is concluded that the Telkes, Adams, and combined focusing/oven cookers, if well designed, are easy to use, versatile, maintenance-free, and effective, and have high potential for widespread use. Although direct-focusing cookers cook well and have a much lower initial cost, they utilize relatively delicate, perishable reflective surfaces that must be replaced periodically. The expense and distribution problems associated with supplying replacement reflectors are comparable to those of supplying kerosene for fuel-burning stoves, which are easier to use. The steam cookers tested did not provide adequate heat for most cooking applications. Test results and some design criteria for Telkes ovens are presented, as well as three new designs for focusing/oven cookers, two of which have been built and tested. The highest performance example yields 700° F oven temperatures, and can heat 1.1 kg of eutectic lead/tin alloy from ambient to the melting point in 20 minutes and from the melting point to 600° F in 27–32 minutes. A 13-item bibliography (1959–78) is appended.

AID/ta-C-1333 931023400
Paper copy $ 3.90 Microfiche $ 1.08

124 **PN-AAJ-326**

LOW-COST EXTRUSION COOKERS, SECOND INTERNATIONAL WORKSHOP PROCEEDINGS, 1979, DAR ES SALAAM, TANZANIA

Colorado State University, Department of Agriculture and Chemical Engineering, Department of Food Science and Nutrition.
1979, 294 p.

Low-Cost Extrusion Cooker (LEC) Report No. 7

Thanks to the recent development of the Brady low-cost extrusion cooker (LEC) and its accompanying technology, consumers in developing countries are beginning to have access to nutritious foods, particularly vitamin-rich foods for infants and young children, which can be processed locally at low cost from locally produced raw foods. These LEC-processed foods have included vitamin-enriched corn-soy-milk (CSM) baby food products marketed under the name of "Lisha" (Tanzania); CSM baby foods marketed under the name of "Thriposha" (Sri Lanka); CSM products, full-fat soy flour, and pea soup (Costa Rica); CSM baby food, breakfast cereals and beverages marketed under the name of "Maisoy" (Bolivia); CSM baby food marketed under the name of "Cerex," and pea soup (Guyana); and full-fat soy flour and other CSM products (Mexico). Other soy products are also being tested, such as textured vegetable protein and soy milk extenders. Other raw food materials currently being tried in pilot programs include coconut, cowpeas, rice, mung beans, winged beans, and pigeon peas. Pilot programs in preparation for the marketing of products processed through LEC's are presently under way in Colombia, Guatemala, Honduras, India, Indonesia, Korea, Pakistan, the Philippines, and Thailand. This report comprises the proceedings of the Second International Conference on LEC's. held January 15–18 in Dar es Salaam, Tanzania, at which representatives from the United States and each of the above countries reported on LEC processing methods and marketing techniques. Policy descriptions are provided of USAID- and U.S. Department of Agriculture-sponsored nutrition programs promoting LEC development. Numerous recipes are included for producing good-tasting meals by combining LEC foods with other ingredients, such as fresh fruit and eggs. Appended are bibliographies (1965–78) totalling 47 items in English, Spanish, and Swahili and the names and addresses of the 43 conference participants (from 17 countries).

RS/USDA-01-74 931083100
Paper copy $38.22 Microfiche $ 3.24

125 **PN-AAJ-347**

STABILIZATION OF RICE BRAN WITH EXTRUSION COOKERS, AND RECOVERY OF EDIBLE OIL: A PRELIMINARY ANALYSIS OF OPERATIONAL AND FINANCIAL FEASIBILITY

Enochian, R.V.; Saunders, R.M.; Schultz, W.G.; Beagle, E.C.; Crowley, P.R.
U.S. Department of Agriculture, Office of International Cooperation and Development.
1980, 52 p.

Rice bran, a by-product of white rice, could become a large source of edible oil if feasible methods can be developed to

stabilize the bran and extract its untapped oil. This study examines the operational and financial feasibility of using extrusion cookers (EC) for this purpose in developing countries. Citing India and Eygpt as trial cases, the report focuses on rice milling operations, rice bran oil extraction, marketing of raw and extracted bran and rice bran oil, and the major rice system components which could impinge technically and economically on EC operations. Analysis shows that EC's apply the heat needed to stabilize the rice bran so as to extract its oil and that installation of EC systems in individual small rice mills would require capital costs of about $6,200, yield 50% on this investment, and produce the equivalent of some 30 metric tons (MT) of edible oil per year. Installation at large mills or centralized locations serving a number of small mills would require $28,000 in capital costs, yield an annual return on investment of 23% in Egypt and 35% in India, and produce approximately 600 MT of edible oil per year. In total, these systems could produce as much as 700,000 MT of additonal edible oil per year in developing countries. Based on previous USAID research showing the feasibility of installing and operating EC systems in developing countries, the authors conclude that EC is operationally and financially feasible for stabilizing rice bran and recovering its edible oil. However, since the present study is based on hypothetical field conditions, field testing should be conducted to verify that: (1) extruder equipment is appropriate for rice bran stabilization; (2) extruder-stabilized bran remains stable for a sufficient time to extract oil; (3) refined oil from varying rice strands and environments is of edible quality; and (4) local operating conditions, repairs, and maintenance permit satisfactory financial returns. The report concludes by suggesting areas for further research. Appended are a 5-item reference list (1971–79), statistics for rice milling and oil extraction plants in India and Egypt, and a description of rice bran stabilization in Burma.

RS-01-74 931083100

Paper copy $ 6.76 Microfiche $ 1.08

126 PN-AAJ-561

THE A.I.D. HAND-OPERATED WATER PUMP: A CLASSIC EXAMPLE OF TECHNOLOGY TRANSFER

Potts, P.W.
Georgia Institute of Technology.
1981, 58 p.

A.I.D.'s technology transfer efforts have enabled various developing nations to produce their own hand-operated water pumps, thereby providing them with improved rural health, a source of pride and employment, and an alternative to costlier imported pumps. This report describes A.I.D.'s project to assess the applicability, initiate the manufacture and installation, and evaluate the performance of locally-produced water pumps in Nicaragua, Costa Rica, the Dominican Republic, Indonesia, Sri Lanka, Tunisia, and Ecuador. A.I.D. and the Georgia Institute of Technology (GIT), the project implementing agent, surveyed various nations' ability to manufacture the pump, their enthusiasm for the endeavor, the pumps' applicability to rural water supply programs (particularly those already involving A.I.D.), and local pump manufacturing costs versus import costs. An initial production run gauged local manufacturers' capabilities, with GIT supplying appropriate technical assistance. After inspection, the pumps were installed in rural areas for field tests, with recipients also receiving on-the-job training in water hygiene and pump maintenance. Under this project, A.I.D.'s U.S.-manufactured Dempster deep and shallow pumps were compared on the basis of local applicability with the Brazilian Marumby pump, the U.S. Moyno pump, the Japanese Lucky pump, and the Canadian International Development Research Centre pump. Robo devices (valves, screens, and meters) were used successfully with the Dempster pump in Sri Lanka, Tunisia, and Ecuador. After initial tests in Nicaragua and Costa Rica, there were several modifications to improve the Dempster pump; the then government of Nicaragua elected to use the pump in a national program, but Costa Rica did not. Manufacture problems included the unavailability of key spare parts, product quality control, and a consistent early underestimation of production costs. Bolivia, Togo, Benin, Liberia, and the Philippines were surveyed but judged ineligible for project inclusion. The report includes a description of the involved host country institutions, diagrams of the Dempster pump, and per-country costs of pump manufacture. A 16-item (1975–80) bibliography is appended to the report.

Clean rural water supply is only one benefit of technology transfer.

AID/ta-C-1354

Paper copy $ 7.54 Microfiche $ 1.08

127 **PN-AAH-745**

SOLAR ENERGY DOMESTIC POLICY REVIEW INTERNATIONAL PANEL POLICY OPTIONS

A.I.D., Bureau for Development Support, Office of Energy.
1978, 87 p.

To a world faced with depleting supplies of traditional energy sources such as fossil fuels, solar energy (SE), which is both clean and renewable, presents itself as a necessary energy alternative. This report presents options for U.S. SE promotion in the three areas of commercialization, technology development, and cooperation with developing countries. After analyzing these options in terms of their consistency with other federal programs, legislative and budgetary requirements, and foreign policy implications, recommendations are made for each of the three above-mentioned areas, as follows: Domestic SE firms should be encouraged to help meet international demand for SE technology by conducting global marketing surveys, advising government agencies on the viability of planned SE projects, and helping to implement the latter. For its part, the U.S. Government should assist in developing SE technology. The Department of Energy, for example, should fund research and development (R&D) projects in SE for specific developing country needs while ensuring that the technology is appropriate to developing country conditions and not to the U.S. market. The United States should also initiate technical cooperation with countries which have significantly developed SE in their own economies. Current U.S. participation in both multilateral (International Energy Agency) and bilateral (France, Saudia Arabia, Spain, U.S.S.R.) SE agreements will soon be extended to include Japan, India, Italy, and Brazil. Given these successes, the U.S. should initiate new bi- and multilateral agreements in SE-powered desalinization, water management, heating and cooling, and agricultural projects. Lastly, the United States should cooperate with developing nations to meet U.S. commitments made at the recent Bonn Economic Summit. The cooperative program will consist of: (1) enhanced R&D on solar technologies; (2) an analysis of the special energy needs and resources of each developing country; (3) support for indigenous SE training; (4) testing and adaptation of solar technologies in developing countries; and (5) a separate international program to exchange SE information and increase awareness of solar technology and its applications.

Paper copy $11.31 Microfiche $ 1.08

128 **PN-AAJ-274**

SENEGAL FOOD AND ENERGY STUDY: ENERGY USE AND OPPORTUNITIES FOR ENERGY-RELATED IMPROVEMENTS IN THE FOOD SYSTEM

Brookhaven National Laboratory; Checchi and Company.
1980, 270 p.

The growth of agriculture, the mainstay of Senegal's economy, is contingent upon the acquisition of imported energy. This study examines the key constituents of the Senegalese food system in relation to energy supply and demand. The study first analyzes the food system (crop characteristics, and physical and institutional components) and the energy system (sources, costs, supply/conversion technologies, and consumption patterns). Next, energy-use profiles are provided on the production and distribution processes of millet/sorghum, rice, groundnuts, and fish. Household cooking practices are also discussed. Relative to other sectors, the food system's commercial energy requirements are small, with over half the energy used expended by motorized fishing crafts. Energy costs are compounded because infestation and decomposition eliminate 25% of the nation's catch. Losses can be reduced by improving solar drying equipment, installing appropriate cold storage facilities, and studying the potential of chemically preserving fish. Since fertilizer is the key to achieving national food self-sufficiency, research on nitrogen fixation through non-chemical means and on increasing the assimilation rate of phosphate rocks by soils is advocated, along with promotion of green manuring and composting practices and development of less energy-intensive fertilizer manufacturing and distribution methods. Recommendations to improve irrigation, the second key to increasing food supplies, include funding for low-capacity photovoltaic and solar-thermal systems, setting up windmills in coastal areas, and designing large-capacity solar plants similar to those at Bakel. To save energy at the household level, wood or charcoal cooking stoves must be made more efficient and the use of biogas plants should be studied. To counter the serious depletion of fuelwood, Senegal's main indigenous energy resource, energy-efficient charcoal production should be developed, the charcoal industry reorganized, and afforestation and forest management programs expanded. A national energy assessment is also recommended. A glossary of study-related Senegalese institutions and a 75-item French and English bibliography (1954–79) are appended.

PA/ERDA/TAB-995-18-76

Paper copy $35.10 Microfiche $ 3.24

129 **PN-AAJ-422**

PRELIMINARY ENERGY SECTOR ASSESSMENTS OF JAMAICA, VOLUME I, EXECUTIVE SUMMARY

Energy Systems International.
1980, 149 p.

ESI Report No. EA-80-0101-1

Because heavy dependence on costly imported fuel has greatly inhibited Jamaica's economic development, USAID/Jamaica and the Government of Jamaica (GOJ) sponsored a preliminary energy assessment to identify and develop viable alternative energy options. Specialized studies included solar energy (commercial/industrial and agricultural), biogas applications, energy conversion from waste, a coal prefeasibility study, and an electric utility rate analysis. Individual studies were published in three volumes (with volume three on renewable energy being in four parts, for a total of six volumes). This first introductory volume provides a lengthy executive summary of

the entire assessment. (A second introductory volume provides an economic assessment of each specialized study area.) After summarizing the findings of the specialized studies, a lengthy series of recommendations is presented. General recommendations include assessing the potential of other promising energy areas; establishing a GOJ office to develop an overall energy conservation plan; identifying the specialized personnel requirements of the GOJ Ministry of Mining and Natural Resources Energy Division; developing the required infrastructure among the various Jamaican groups involved in energy programs; and developing and implementing training and technical assistance plans for GOJ energy program personnel. Specific recommendations include implementing solar water heating, solar agricultural drying, and biogas applications programs; studying waste collection problems in Kingston; establishing an Alternative Energy Laboratory at the University of the West Indies' Mona Campus; upgrading existing oil-fired electric power plants; investigating a possible coal-fired plant and coal supply and shipping; monitoring coal-oil mixture development and coal gasification technology progress; and having the Jamaican Public Service Company assess various options for electric utility rates. A Combined Energy Program based on these recommendations would be economically beneficial and should be implemented. Appendices include a five-item bibliography (1978–79), profiles of the U.S. energy assessment team members, and a summary of a splinter group discussion.

AID-532-79-11

Paper copy $19.37 Microfiche $ 2.16

130 **PN-AAJ-423**

PRELIMINARY ENERGY SECTOR ASSESSMENTS OF JAMAICA, VOLUME II, ECONOMIC ASSESSMENT

Energy Systems International.
1980, 111 p.

ESI Report No. EA-80-0101-2

Because heavy dependence on costly imported fuel has greatly inhibited Jamaica's economic development, USAID/Jamaica and the Government of Jamaica (GOJ) sponsored a preliminary energy assessment to identify and develop viable alternative energy options. Specialized studies included solar energy (commercial/industrial and agricultural), biogas applications, energy conversion from waste, coal prefeasibility study, and electric utility rate analysis. These studies were published in three volumes (with volume three on renewable energy being in four parts, for a total of six volumes). A first introductory volume provides an executive summary for the assessment as a whole. This second introductory volume presents an economic assessment of the specialized study areas, reviewing recommendations from the specialized studies in relation to each other and to the GOJ's 5-year Development and Energy Sector Plans. After analyzing the effects of these recommendations on Jamaica's energy situation and economy, the recommendations are integrated and prioritized in a proposed Combined Energy Program (CEP) which is recommended for immediate GOJ implementation. Highest priority items include research, testing, training, and tax structures to encourage solar hot water and agricultural drying systems; installation of small- and medium-size biogas plants; and negotiating joint port usage for a possible coal-fired electricity plant. Costs of the proposed program are modest (a maximum of $6.25 million), while the resulting reduction in net energy imports is estimated to be 4.4% by 1985 and 8.3% when fully implemented. Most of the projects can be initiated in the CEP's first year and can begin producing benefits in the first or second year. Reliance on imported technology or commodities is relatively low. Because of the many GOJ agencies involved, it is suggested that an Interagency Energy Coordinating Committee be formed to resolve conflicts and facilitate exchange of information. Appendices include a 13-item bibliography (1976–79), contract statement of work, a list of discussions held (and with whom) in preparing the study, and modifications required in the GOJ's Energy Sector Plan to accommodate the CEP.

AID-532-79-11

Paper copy $14.43 Microfiche $ 2.16

131 **PN-AAJ-424**

PRELIMINARY ENERGY SECTOR ASSESSMENTS OF JAMAICA, VOLUME III, RENEWABLE ENERGY: SOLAR ENERGY—COMMERCIAL AND INDUSTRIAL

Energy Systems International.
1980, 100 p.

ESI Report No. EA-80-0101-3a

Because dependence on costly imported fuel is greatly retarding Jamaica's economic development, USAID/Jamaica and the Government of Jamaica sponsored a preliminary energy assessment to identify and develop viable alternative energy options. Technological studies were published in three volumes (with volume three being in four parts, for a total of six volumes), to which two introductory volumes were added, providing, respectively, an executive summary of the entire assessment and an economic assessment of the individual areas. This study, the first part of volume three, concerns commercial and industrial solar applications, specifically solar water heating and solar air cooling. The study finds that solar domestic water heating and boiler make-up water preheating are technically feasible and, depending on the displaced energy source (electrical or various fuel types), economically justified; and that solar hot water installations could displace the equivalent of 189,842 barrels of fuel oil per year. However, solar cooling requires high performance collectors not currently manufactured in Jamaica, and feasibility studies indicate that solar cooling in the near term is not economically justified. Specific recommendations for a 3-year program are: establish a solar collector performance testing and certification program and 10 climatic stations to record solar radiation and ambient temperatures; eliminate the 37.5% tax on water heater tanks in solar

systems; establish a consumer energy information office, training courses for solar system installers, and college-level energy conservation and solar application programs for architects and engineers; investigate the possible export of Jamaican solar products; provide technical support to the Residential Solar Demonstration Program; start indepth feasibility studies of industrial, commercial, and hospital solar hot water applications; establish tax incentives for solar applications; and start an institutional solar hot water demonstration program. Appendices include, inter alia, a five-item bibliography (1977–79), some interim guidelines for solar water heaters in Jamaica, various technical reports, and the summary of a splinter group discussion.

AID-532-79-11

Paper copy $13.00 Microfiche $ 1.08

132 PN-AAJ-425

PRELIMINARY ENERGY SECTOR ASSESSMENTS OF JAMAICA, VOLUME III, RENEWABLE ENERGY: SOLAR ENERGY—AGRICULTURAL

Energy Systems International.
1980, 70 p.

ESI Report No. EA-80-0101-3b

Because heavy dependence on costly imported fuel is greatly hindering Jamaica's economic development, USAID/Jamaica and the Government of Jamaica sponsored a preliminary assessment study to identify viable alternative energy options. Technological studies were published in three volumes (with volume three being in four parts, for a total of six volumes), to which two introductory volumes were added, providing, respectively, an executive summary of the entire assessment and an economic assessment of the individual areas. This study, part two of volume three, is concerned with the use of solar heat for drying agricultural products (crops, timber, and fish). The study finds that Jamaica has an ideal climate for solar agricultural product drying with the following methods offering the greatest promise: sun drying using open barbeques; drying in transparent buildings (with or without attached collectors) for small operations; new drying systems using solar air heaters with forced air drying; preheating air for existing commercial fossil-fueled dryers; and fish drying via chemical dehydration with solar regeneration of the chemical. The primary needs are to develop and construct environmentally suitable solar dryers and to train engineers in solar system design and installation. Specific recommendations include establishment of 10 climatic stations to record solar radiation and ambient temperatures; development of air-type solar collectors; research and development on agricultural product drying and on cost-effective drying methods; encouragement of sun drying; construction of solar-heated, forced-air dryers (and providing the training necessary for design, construction, and operation); and construction of supplemental solar heaters for preheating at commercial drying facilities. Increased use of agricultural solar drying would provide a better supply of food products throughout the year and would also improve Jamaica's balance of payments. Appendices include a 15-item (1970–79) bibliography; a list of interviewees; data on various solar applications including computed solar radiation, solar preheating of air for rotary drum drying and agricultural product drying; and a summary of a splinter group discussion.

AID-532-79-11

Paper copy $ 9.10 Microfiche $ 1.08

133 PN-AAJ-426

PRELIMINARY ENERGY SECTOR ASSESSMENTS OF JAMAICA, VOLUME III, RENEWABLE ENERGY: BIOGAS APPLICATIONS

Energy Systems International.
1980, 84 p.

ESI Report No. EA-80-0101-3c

Because heavy dependence on costly imported fuel is greatly hindering Jamaica's economic growth, USAID/Jamaica and the Government of Jamaica sponsored a preliminary assessment to identify viable alternative energy options. Technological studies were published in three volumes (with volume three being in four parts, for a total of six volumes), to which two introductory volumes were added, providing, respectively, an executive summary of the entire assessment and an economic assessment of the individual areas. This study, the third part of the first technical volume, considers the feasibility of biogas generation and applications. Biogas is a high grade fuel produced by anaerobic digestion of organic matter such as farm crops or animal manure and is useful for cooking and other purposes. The Jamaican Scientific and Research Council (SRC) has developed and tested a family-size biogas plant and is currently designing a medium-size plant. A climate eliminating the need for costly digester equipment, the lower cost of biogas relative to imported oil, and widespread enthusiasm for biogas lead to the conclusion that a national biogas program would be successful. Recommendations for implementing this program are: select one of SRC's family- and medium-size biogas plant designs for large-scale implementation; implement a 5-year plan to deploy 2,700 family-size and 41 medium-size biogas plants; determine the feasibility of a large-scale biogas unit to generate electricity and the possibility of constructing more family- or medium-size biogas plants; assess the commercial potential of the biogas plant design in Jamaica and other countries and decide on the basis of this assessment whether to implement an accelerated biogas program; establish a national biogas program organization; and begin a comprehensive training and public awareness program. Installation of a biogas collector at the University of the West Indies' Mona Campus sewage treatment plant was rejected as uneconomical due to the plant's small size. Appendices include a five-item bibliography (1975–79), data on other biogas pro-

grams, lists of the study's information sources, a biogas survey questionnaire, and a summary of a splinter group discussion.

AID-532-79-11

Paper copy $10.92 Microfiche $ 1.08

134 PN-AAJ-427

PRELIMINARY ENERGY SECTOR ASSESSMENTS OF JAMAICA, VOLUME III, RENEWABLE ENERGY: ENERGY CONVERSION FROM WASTE

Energy Systems International.
1980, 60 p.

ESI Report No. EA-80-0101-3d

Because heavy dependence on costly imported fuel is greatly hindering Jamaica's economic growth, USAID/Jamaica and the Government of Jamaica sponsored a preliminary assessment to identify viable alternative energy options. Technological studies were published in three volumes (with volume three being in four parts, for a total of six volumes), to which two introductory volumes were added, providing, respectively, an executive summary of the entire assessment and an economic assessment of the individual areas. This study, the fourth part of the first technical volume, considers the feasibility of energy conversion from wastes. Specifically, the study analyzes the potential for energy recovery from urban wastes in Jamaica, with the Kingston area serving as a case study, and assesses the feasibility of building a prototype demonstration unit for energy recovery from solid wastes at the University of the West Indies (UWI)-Mona Campus. Steam-generating waterwall combustion, refuse-derived fuel systems, pyrolysis, anaerobic biological conversion (biogas), and gas recovery from landfills are discussed as alternative systems for energy recovery from urban wastes. It is concluded that the only practical alternative for use in Kingston is waterwall combustion. This program could be cost-effective, but cannot currently be applied because of inefficient and unreliable refuse collection. It is therefore recommended that a detailed study be made of the physical, management, and sociological aspects of the refuse collection problem. With respect to a demonstration program at UWI-Mona Campus, it is concluded that biogas generation would be the only suitable process given the size of the program's waste treatment plant. However, because of the heterogeneous nature of urban wastes and the low efficiency of the recovery process, this method will probably not have widespread urban usage. It is therefore recommended that UWI's Mona Campus not proceed with a field-scale biogas generation demonstration unit, but rather that it be financially assisted in developing a laboratory to study various energy alternatives. Appendices include a 9-item bibliography (1968–79) and a summary of a splinter group discussion.

AID-532-79-11

Paper copy $ 7.80 Microfiche $ 1.08

135 PN-AAJ-428

PRELIMINARY ENERGY SECTOR ASSESSMENTS OF JAMAICA, VOLUME IV, COAL PREFEASIBILITY STUDY

Energy Systems International.
1980, 118 p.

ESI Report No. EA-80-0101-4

Because dependence on costly imported fuel is hindering Jamaica's economic growth, USAID/Jamaica and the Government of Jamaica (GOJ) sponsored a preliminary assessment to identify viable alternative energy options. Technological studies were published in three volumes (with volume three being in four parts, for a total of six volumes), to which two introductory volumes were added, providing, respectively, an executive summary of the entire assessment and an economic assessment of the individual areas. This study, the second technical volume, assesses the technical, economic, and environmental feasibility of diversification from oil to coal for generating electric power for the Jamaican Public Service Company (JPS) and the bauxite/alumina industry. The study found that the JPS system has sufficient capacity for current demand, but better maintenance, especially of the newer, more efficient units, is needed to avoid blackouts. Current JPS and alumina company boilers cannot be retrofitted to burn coal directly, but may be able to burn a coal/oil mixture or coal gasification product. Developments in these areas should be monitored. Evaluation of four alternative electricity generating schemes (coal-fired, combined-cycle gas turbine, low-speed diesel, and oil-fired) indicates that coal-fired units will provide economic benefits only if port and coal unloading facility costs are kept low or if the coal-oil cost differential widens rapidly. Old Harbour Station, Montego Bay, Port Esquivel, and Cuckold Point in New South Manchester are possible sites for a coal-fired plant. Negotiations should be begun for joint use of the harbor facilities and site at Port Esquivel and Cuckold Point. If these negotiations succeed, a more detailed cost and cost-benefit estimate should be prepared. Although coal supply and shipping conditions seem favorable, a study is recommended to confirm the delivered price of coal. While a preinvestment feasibility study is not recommended at this time, a full feasibility study is recommended in 2–3 years if all other factors prove positive. Appendices include a list of four references (1978), data on various energy programs/sectors, and a summary of a splinter group discussion.

AID-532-79-11

Paper copy $15.34 Microfiche $ 2.16

136 PN-AAJ-429

PRELIMINARY ENERGY SECTOR ASSESSMENTS OF JAMAICA, VOLUME V, ELECTRIC UTILITY RATE ANALYSIS

Energy Systems International.
1980, 134 p.

ESI Report No. EA-80-0101-5

Because heavy dependence on costly imported fuel is greatly hindering Jamaica's economic development, USAID/Jamaica and the Government of Jamaica sponsored a preliminary assessment to identify viable alternative energy options. Technological studies were published in three volumes (with volume three being in four parts, for a total of six volumes), to which two introductory volumes were added, providing, respectively, an executive summary of the entire assessment and an economic assessment of the individual areas. This study, the last of the three technical volumes, analyzes the electric utility rate structure of the Jamaica Public Service Company (JPS) in order to determine whether it promotes economically efficient use of electricity, is based on principles of equity and fairness, and provides JPS with sufficient resources to maintain acceptable service quality. Current tariffs are described, and features such as declining block tariffs (decreasing unit price with increasing volume used), expander clauses (decreasing rate if total energy use increases without increasing maximum power demand), and ratchet clauses (little or no reduction in charges if use falls below a previously set high), which may not encourage conservation or efficient system usage, are noted. Various tariff options, based on marginal cost pricing principles (tying prices to the additional cost of supplying the electricity), are presented for each rate category in the JPS system (residential, small commercial, industrial, and large commercial). Flat rate (with and without demand charges), time of use pricing, fuel adjustment, and cost of service adjustment are considered. These options demonstrate immediate or interim steps that can be taken to gradually approach marginal cost pricing. The effects of each step in tariff development and the associated customer bill impacts are indicated. As requested by JPS, specific recommendations for the type of tariff system to be adopted are not presented. It is recommended that JPS review and analyze these options and present its own suggestions to the Ministry of Public Utilities. Appended are a 10-item bibliography (1958–77) and a summary of a splinter group discussion.

AID-532-79-1

Paper copy $17.42 Microfiche $ 2.16

137 **PN-AAJ-432**

ENERGY FOR AFRICA; SELECTED READINGS

French, D.; Larson, P.
A.I.D., Bureau for Africa, Office of Development Resources, Special Development Problems Division.
1980, 201 p.

The scarcity of Africa's energy supplies threatens the continuation of development programs vital to its poor. This report presents seven studies relevant to meeting this challenge. The first study, questioning whether tree planting and developing renewable energy will be able to replace the rapidly diminishing oil and fuelwood oil which now satisfy 90–100% of Africa's energy needs, contends that scarce/expensive energy will become a permanent condition and therefore urges governments at once to recalibrate their development strategies accordingly. The next study, which examines how fuelwood-policy decisions are made and executed, recommends further study on two possible ways to provide incentives for local fuelwood management: privatizing land and trees and strengthening local ability to manage common resources. The third study asserts that promotion of energy technologies should proceed by taking a preliminary socioeconomic survey of the target group, discussing the proposed technology with the group, and then collecting data to determine the technical, social, and economic feasibility of the proposed system. A key to this approach is the use of appropriate analytical filters, e.g., cost/benefit analysis for judging economic feasibility. The next study analyzes energy system return rates by using the dissemination cost/ratio method, i.e., comparing the incremental budgetary cost of new energy units with their incremental value to society. The incentive to buy, the availability of resources, and the ease of dissemination are constituents of this process. A fifth study holds that villagers are more likely to adopt technology the more the choice is spontaneous and not forced, and if the technology coincides with their self-interest and is controllable. A study on community participation in fuelwood projects reveals that project success requires the participation of all parties—specifically, of villagers—and recommends joint agreement on issues such as goals and procedures prior to the project. The final study, on the role of evaluations in energy projects, poses questions to be asked during project implementation and recommends continual project monitoring. Individual bibliographies are appended.

Paper copy $26.13 Microfiche $ 3.24

138 **PN-AAJ-471**

AN OVERVIEW OF ENERGY STRATEGIES FOR JAMAICA

Palmedo, P.F.; Ashby, W.R.; Doernberg, A.; Tunnah, B.; et al.
Energy/Development International; Energy Systems International.
1981, 78 p.

Jamaica, with a virtual total dependence on imported oil, must develop alternative energy sources if expected GNP growth rates are to be achieved. This study selectively assesses alternative energy techniques and places Jamaica's various energy options in perspective according to anticipated levels of energy demand. The major energy options considered include use of coal and peat in industry and electric generation; promotion of energy conservation in industry, transportation, and utilities; hydropower; solar power; and biomass generation. Each option is evaluated in terms of its commercial availability, capital and production costs, oil savings, and foreign exchange impact. Although the demand for oil is expected to rise 60% in the next 10 years, the report predicts that a strategy combining various alternative energy sources could reduce oil as a

fraction of Jamaica's total energy consumption from the present level of 97% to 64% by 1990. In the short run—the next five years, the most effective measures to reduce oil imports include implementation of a slow-speed diesel generator in public utilities; conservation in the industrial and transportation sectors; use of coal in major electric power industries; more efficient use of bagasse in the sugar industry; domestic and commercial use of solar water heaters; and medium-scale hydropower. Because few options exist for direct fuel use in the household and transport sectors, increased energy efficiency, liquid fuels from biomass, and household fuels such as charcoal should receive added attention. In the intermedite term, ocean thermal energy conversion systems, large-scale hydropower, use of urban waste for power generation, and use of wood or charcoal could be viable. Depending on technical performance, environmental implications, and social acceptability, solar ponds, high temperature solar collectors, wood-based electricity generation, and liquid fuels derived from sugar, tropical grasses, or fast-growing trees could prove important over the long run—up to the year 2000. Option work sheets based on varying assumptions in each energy sector are appended.

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139 PN-AAJ-490

ENERGY AND DEVELOPMENT IN CENTRAL AMERICA, VOLUME ONE: REGIONAL ASSESSMENT

Park, W.; Neves, C.; Trehan, R.; Ackerman, E.; Gallagher, W.; Palmedo, P.; Doernberg, A.; Oberg, K.; Kyle, S.
Mitre Corporation.
1980, 127 p.

Volume II., Country Assessments: PN-AAJ-491, 348 p.

A survey of Central American (CA) energy needs and resources was conducted to help CA countries and USAID and other donor organizations define, plan, and meet CA energy needs. Results of that survey have been published in two volumes, of which this first assesses energy concerns and strategies on a regional basis. Volume two provides country energy assessments. Petroleum and noncommercial biomass are currently the region's most commonly used energy sources, but there is significant energy potential in water, geothermal, solar, and wind resources as well. The region's petroleum consumption (excluding Panama) grew 7% from 1968–76, while the yearly growth of electric generation between 1965–77 was 10.6%. Energy demand projections show petroleum demand increasing 3.6–5.4% and that of noncommercial fuel 2.9% annually to the year 2000. Given the problems created by high-priced oil and wood depletion, three alternative energy strategies—imported oil substitution, conservation, and rural energy development—are outlined to exploit the region's projected resource potential. Possible substitutes for imported oil include developing indigenous oil reserves, using electric power generated by hydro, geothermal or solar means, and employing methanol from trees or ethanol from sugar cane or other crops to fuel transit systems. Prospects are good for conserving 10–20% of energy demanded through better energy management, minor capital investments, and promotion of mass transit systems. Alternative forms of rural energy include replacing diesel generators with solar, hydro, or wind generators; developing reforestation policies; and promoting rural electrification. It is recommended that USAID support: (1) development of country energy policies and institutions, biomass-based liquid fuels, and country conservation and rural energy programs; (2) renewable energy resource assessments; (3) innovative energy research; (4) dissemination of energy development information; and (5) regional energy institutions such as the CA Institute for Industrial Research and Technology (ICAITI). Appended are conversion tables, a list of CA contributors to the study, and a 15-item bibliography (1976–80) in English and Spanish.

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140 PN-AAJ-491

ENERGY AND DEVELOPMENT IN CENTRAL AMERICA, VOLUME TWO: COUNTRY ASSESSMENTS

Ackerman, E.; Doernberg, A.; Gallagher, W.; Kyle, S., et al.
Mitre Corporation.
1980, 348 p.

Volume One: Regional Assessment, PN-AAJ-490, 127 p.

Energy development is critical to Central America's (CA) future. This second of two volumes on energy and development in CA provides energy assessments for six CA countries to supplement the regional energy assessment given in Volume I. Each profile outlines in-country geographic, social, and economic factors affecting energy consumption; assesses energy resources and institutions; describes current energy-use patterns and applies Volume I methods to forecast energy needs to the year 2000; and develops basic energy strategies. Besides specifying the regional recommendations given in Volume I, the report recommends the following for USAID support: (1) in Guatemala—a conservation office/program, rural energy development (e.g., technology centers and education programs), extension of rural electrification, reforestation, and institution-building for technology transfer; (2) in Honduras—institution-building in energy research and development in minihydro, coal, and solar energy, and determining the feasibility of proposals regarding charcoal, cement, and agricultural residues; (3) in Nicaragua—geothermal development (financial support), assessing minihydro potential, and controlling brine-related air and water emissions; (4) in Costa Rica—integrating energy/transportation planning, reducing/displacing petroleum use in irrigation, food processing, packaging, transportation, and fertilizer operations, hydrocarbon research, and wind and solar assessments; and (5) in Panama—a national energy

organization (as a prerequisite to further USAID support), energy-conservation skills (in all USAID assistance), energy-related curriculum development at the University of Panama, resource assessments, and Panamanian participation in regional energy initiatives. Also recommended are efforts to derive ethanol from sugarcane in Nicaragua, Guatemala, and Honduras; use of Peace Corps Volunteers in rural energy programs in the latter two countries; and training for government officials in natural resource assessment and energy/environmental planning in Honduras and in fossil fuels and energy planning in Nicaragua. El Salvador requires further study before recommendations can be made. Bibliographies follow each section.

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141 PN-AAJ-628

ENERGY IN IRRIGATION IN DEVELOPING COUNTRIES; AN ANALYSIS OF ENERGY FACTORS TO BE INCLUDED IN A NATIONAL FOOD POLICY

Smerdon, E.T.; Hiler, E.A.
1980, 82 p.

In response to the challenge posed by escalating increases in the amount of energy needed for irrigation in developing countries, this report analyzes current energy consumption in irrigation, renewable energy technologies, and relevant food policy issues facing developing country governments. The authors find that developing groundwater supplies entails twice the energy costs of developing surface water supplies, and that the latter can be more efficiently manufactured, installed, and operated in developing countries. In determining the amount of energy needed to manufacture, install, and operate various irrigation systems, it is found that sprinkler and trickler systems are competitive only when pumping lifts are very high (100 meters). Discussion of renewable energy sources covers biomass systems such as direct combustion and gasification, as well as solar and wind sources. Currently, agricultural production of biomass fuel is a problem due to the fuel/food conflict in developing countries. The potential of solar power, e.g., photovoltaic cells, is also discussed. Unfortunately, solar costs remain high. Finally, wind energy was found to be technically more suitable for developing countries than biomass and solar sources. The impact of energy alternatives on the food production effectiveness of irrigation systems is also assessed, with stress laid on the importance of providing water at crop-critical times—a point of essential importance for systems such as windmills. Energy is best saved by eliminating water losses, although upgrading poorly designed irrigation systems can also save water and energy supplies. Recommendations, in their order of priority, are: reduce water losses in watercourses and water distribution systems; improve on-farm irrigation practices; maintain irrigation pumps; water crops only in accordance with their needs; and use surface water sources when available. It is also recommended that research concentrate on improving on-farm water management systems and that governments realistically assess their irrigation systems' energy needs in light of food needs. Tables, graphs, appendices, and a 83-item bibliography (1954–80) are provided.

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142 PN-AAJ-698

ENERGY RESOURCES IN SOUTHERN AFRICA: A SELECT BIBLIOGRAPHY

Cavan, A.
African Bibliographic Center.
1981, 72 p.

In Southern Africa Development Information/Documentation Exchange (SADEX)

The high cost of imported oil is forcing developing nations to examine their domestic resources for energy alternatives. Accordingly, many nations of Southern Africa are studying their possible use of the region's lakes and rivers to generate hydroelectric power; employing geological teams to explore for coal, gas, oil, and uranium; and examining their use of firewood and the resultant impact upon the environment. In addition, innovative energy sources such solar and wind power, are being tested and applied throughout the region. The aims, progress, and possibilities involved in Southern Africa's energy development are the subject of this 473-item bibliography. The primary items of information described in this document are relatively recent (1975–81), originate from both indigenous and international sources, and are mostly in English, although a few are in French and Portuguese. The presented information focuses on the African continent, the Southern African region, and the nations of Angola, Botswana, Lesotho, Malawi, Mozambique, Namibia, Swaziland, South Africa, Tanzania, Zambia, and Zimbabwe. The energy source topics include alcohol, coal, gas, oil, solar, uranium, water, wind, and wood; as well as a general energy-development category. The bibliographical listings for some nations include many categories—such as Zambia's development of its alcohol, coal, oil and gas, uranium, water, and wood energy sources. For other nations, however, the listed categories are few, e.g., Malawi's general and alcohol energy development.

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SOCIAL SCIENCE

143 PN-AAH-488

YAOUNDE HOUSEHOLD AND HOUSING CHARACTERISTICS

Government of Cameroon, Ministry of Equipment and Housing, Urban and Rural Lands Development Authority.
1978, 175 p.

In cooperation with USAID/Cameroon

To develop plans for appropriate low-income housing in Yaounde, Cameroon, Cameroonian and USAID specialists surveyed 97 households representing each of the city's seven urban housing types. Surveyors concentrated on lower income housing types, but included some middle- and upper-income households for comparative purposes. This three volume report presents the survey results, housing policy implications, and case studies for each housing type. In Part I of Volume I, the land use, location, population density, and levels of municipal service are compared for each housing type, and differences among the three broad socioeconomic groups inhabiting urban housing are examined. In Part II of Volume I, policies to best meet Yaounde's housing needs are described. A major recommendation is to orient policy and programs in favor of the poorest household group (Group I), which makes up 85% of the total urban population. The services most critically needed by this group are access roads, water supply, street lighting, and electricity. The authors recommend that Group I households participate in providing or upgrading these basic neighborhood services. In addition to infrastructure improvements, the development of a coherent land ownership policy, especially land title regularization, improved access to credit, and construction information are recommended as priorities over physical improvement of homes. The paper predicts the number of low-income dwelling units and related services which Group I will require as it increases. Newly developed areas should be located close to employment zones to avoid failures caused by lack of adequate, affordable transportation. Volume I contains annexes on data collection methods and infrastructure standards. Volume II presents details of the data collected, including household social and economic characteristics (family size, religion, income, rent, etc.), housing descriptions, existing levels of service and infrastructure, and needed improvements in health, education, and employment services. Volume III presents graphs and data on 50 case studies and two annexes—a functional analysis of a typical low-income dwelling unit and a table of average room size per housing type.

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144 PN-AAH-597

THE HILL PEOPLE OF NORTHERN THAILAND; SOCIAL AND ECONOMIC DEVELOPMENT

Hickey, G.C.; Wright, J.
1978, 285 p.

Until recently, Thailand's hill people were largely neglected by the central government. Although numerous development programs, many attempting to introduce new cash crops as substitutes for opium poppies, have been introduced since 1970, the basic circumstances of the hill people remain unchanged. A nutrition survey in Chiang Mai showed that highland children are almost 50% deficient in protein. The average percent of hill people with no education is 76%, compared to the national average of 26%. Furthermore, 41% of the hill people have no ability in the Thai language. The purpose of this study, which was based on a study of documentary materials, interviews with various Thai government officials, and field studies, is to provide background information to be used in designing development projects for the hill people, especially a proposed Hilltribe Integrated Rural Development (HIRD) Project. This report consists of four parts: (1) a summary of findings and recommendations; (2) a brief characterization of the various hill people and a discussion of Thai government policy toward them; (3) an analysis of the dynamics of change in Northern Thailand; and (4) a survey of current socioeconomic conditions among the hill people. The authors conclude that the potential for successful socieconomic development programs does exist. Considerable social and economic change has already occurred—e.g., village isolation is breaking down, more hill people have begun to participate in the market economy, and some new career opportunities are opening up. The authors recommend that USAID/Thailand formulate programs to improve the hill peoples' standard of living and to provide them with greater occupational opportunities. They also recommend that USAID support existing Thai education and health programs directed at the hill people and implement the proposed HIRD Project as a model socioeconomic development scheme. Included are appendices on Northern Thailand's physical environment and on its social, economic, political, and religious systems; the population and nutritional status of hill people; a case study of a special education school established for them; and a bibliography (70 entries, 1876–1978).

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Paper copy $37.05 Microfiche $ 3.24

145 PN-AAH-943

SAHELIAN SOCIAL DEVELOPMENT

Reyna, S.P.
A.I.D., Regional Economic Development Services Office, West Africa.
1980, 716 p.

Today in the Sahel one can raise animals or plants and be very poor; or one can leave. Such is the dilemma examined by the five authors whose studies of Sahelian social development comprise this book. "A Brief History of the Sahel" concentrates on the pre-colonial, colonial, and post-colonial eras of development and their effect on the ecosystem and people of the Sahel. "The Fulani in a Development Context" refutes the stereotype of Sahelian pastoralists as a people so infatuated with their animals that they wander about the bush singing songs and dedicating poetry to their beasts, when they should be selling

them at the local abattoir. The Fulani (who instead sell milk and butter) see their herds as a trust and are unwilling to part with any of their dividend-producing stock. Furthermore, the Fulani are nomads, not because they love wandering, but because it enables them to feed their cattle. Thus, what is often perceived as backwardness is in reality a rational adaptation to a limited, harsh environment. "The Conditions of Agricultural Intensification in the West African Savannah" examines climate, soils, and farming practices in the Sahel region. Following a general discussion, three case studies are outlined involving the Kasasi of Ghana, the Hausa of Nigeria, and ethnic peoples of the Niger Delta of Mali. Although the authors fail to see any simple relationship between environment and farming systems, they note that existing food-production strategies do seem designed to minimize environmental risks. In "Development for Whom", the author addresses the distribution of benefits from large-scale agricultural intensification projects (especially irrigation projects) and concludes that the rural poor are not among the beneficiaries. In most instances, these projects are actually resettlement schemes, forced on and inhospitable to local culture and traditions. In "Cooperatives, Initiative, Participation and Socio-Economic Change", the author reaches similar conclusions with regard to the impact of government-run cooperatives and parastatals. Footnotes or bibliographies follow each article. Most of the publications listed are in English, with a significant number of French titles appearing as well.

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146 **PN-AAJ-633**

RURAL ORGANIZATIONS IN SOUTH INDIA: THE DYNAMICS OF LABORER AND TENANT UNIONS AND FARMER ASSOCIATIONS IN KERALA AND TAMIL NADU

Alexander, K.C.
Cornell University, Center for International Studies, Rural Development Committee; National Institute of Rural Development.
1980, 105 p.

Special Series on Rural Local Organization No. 2

Rural organizations, prominent features in agrarian development, are capable of transforming political and socioeconomic relationships. This study examines the emergence of peasant organizations in the Indian districts of Kerala and Tamil Nadu. The report describes the various agricultural laborer and tenant organizations and tiller and farmer associations and the factors affecting membership and participation. These organizations are also analyzed in light of several theories of peasant mobilization which claim peasant movements result from deteriorating economic conditions, depend upon a geographically or organizationally concentrated rural proletariat, and require a perception of traditional institutions and relations as illegitimate. Investigation is made of various changes in agrarian relations, such as the radical tenure reforms in Kerala and the improvement of patron-client relations in Alleppy, Tamil Nadu, which have yielded substantial economic and social improvement. The report addresses the political polarization which peasant movements have brought about. Whereas unorganized peasants are deprived of almost all political power in the village, organized peasants increasingly defend their interests in the political arena, often with the aid of the Indian Communist Party (CP). On the other hand, caste, except in the case of the Harijan caste which is dominant among rural laborers, has impeded peasant unity. The division of the peasantry between landless laborers and those employed on their own small holdings is an additional and powerful barrier to solidarity. Many small farmers with marginal holdings have joined larger farmers in forming groups such as the All-Kuttanad Farmers Association which are antagonistic to the CP and its efforts on behalf of the landless. Also, neither the inability of cropping systems to satisfy demand, the deplorable level of living, nor the infusion of capitalism have been sufficient to mobilize peasants. Thus, the report concludes that India's poor are divided into hostile groups which for the time being will prevent development of organizations embracing all sections of the rural poor.

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147 **PN-AAJ-644**

LOCAL ORGANIZATION DIMENSIONS OF RURAL DEVELOPMENT IN TURKEY: SOCIO-ECONOMIC STRATIFICATION ORIENTATIONS TOWARD PARTICIPATION, AND ATTITUDINAL MODERNITY

Copur, H.
Cornell University, Center for International Studies, Rural Development Committee.
1980, 82 p.

Special Series on Rural Local Organization, No. 5

Although Turkey's agricultural sector employs 75% of its people and accounts for nearly all its exports, the country's overall economic development requires strenuous efforts to raise rural productivity, boost agriculture's contribution to GNP, and achieve more equitable distribution of rural incomes. Such are the conclusions of this study, performed under the auspices of Cornell University's Rural Development Committee, aimed at finding correlations between the socioeconomic and attitudinal composition of rural organizations and the development of the agricultural sector. Seven thousand villagers in 458 villages were surveyed in terms of the variables noted below. The following correlations were made: (1) Advanced village development strengthens the tendency to initiate and participate in organizations. (2) Equal distribution of wealth is directly proportional to village development, especially in villages with high levels of organizational intiative, technological development, and equal land distribution. There is little or no direct proportionality between equal land distribution and level of village development alone. Equal land distribution and village development are directly proportional, however, when village organizational initiative is high or wealth distribution is equitable or when these two conditions are found together. (3) Variations in village development are not directly proportional to improve-

ments in agricultural technology except when organizational initiative is high; equity in wealth is high; equity in land distribution is high; and organizational initiative is high and wealth distribution is equitable. (4) In general there is no relationship between the degree of fatalism in a village's attitude and the degree of village development. However, where feelings of personal efficacy are expressed, village development is usually high if organizational initiative is high and land and wealth distribution is equitable. (5) Level of education is directly proportional to village development when organizational initiative is high and land distribution is equitable. Illustrative tables are included.

AID/ta-BMA-8 931113700

Paper copy $10.66 Microfiche $ 1.08

148 **PN-AAJ-645**

LANDLESSNESS AND RURAL POVERTY IN LATIN AMERICA: CONDITIONS, TRENDS, AND POLICIES AFFECTING INCOME AND EMPLOYMENT

Lassen, C.A.
Cornell University, Center for International Studies, Rural Development Committee.
1980, 192 p.

Special Series on Landlessness and Near-Landlessness No. 4

A major fallacy in discussing the Third World's rural poor is to depict them as an undifferentiated mass of small farmers. This report argues that while small farmers in Latin America are generally poor, the 65% of Latin America's rural population who are landless and near-landless (LNL) are destitute. To support this premise, the report outlines the dimensions, sources, and trends in Latin American rural poverty, who the LNL are, and what can be done to mitigate their hardship. The LNL—agricultural and non-agricultural rural workers, marginal and tenant farmers, and the non-sedentary poor—earn low pay, have few job opportunities, and lack assets as well as access to public goods and services. Their plight has two root causes. The first is institutional rigidities which concentrate resources in the hands of large producers, even in countries such as Argentina, Uruguay, and Paraguay where arable land is abundant; or which ban the formation of migrant and tenant interest groups as occurs in Brazil, Chile, Paraguay, and Uruguay. The second main cause is the increasing commercialization of agriculture promoted by governments to provide cheap domestic food and exports as in Brazil, Guatemala, and Bolivia; or, again as in Brazil, by the emergence of large concerns and foreign agribusinesses which eliminate the small trader and producer. The increasing displacement of labor due to farm mechanization also contributes to the plight of the LNL. All of these factors have led to an accelerating proletarianization of the rural worker. In this process, traditional patron-client relationships have broken down, weakening the old forms of vertical and horizontal solidarity among the poor and opening the door to their exploitation by political and economic middlemen. To reverse this situation, policies are needed to raise the price of LNL-produced goods and services and preserve more of their real income and to develop income-generating employment programs on their behalf. The report concludes by recommending further research in areas such as employment, seasonal migration, commercial farming, and labor laws. Country profiles are appended.

AID/ta-BMA-8 931113700

Paper copy $24.96 Microfiche $ 2.16

149 **PN-AAJ-646**

LANDLESS PEASANTS AND RURAL POVERTY IN INDONESIA AND THE PHILIPPINES

Rosenberg, J.G.; Rosenberg, D.A.
Cornell University, Center for International Studies, Rural Development Committee.
1980, 136 p.

Special Series on Landlessness and Near-Landlessness, No. 3

The dramatic rise in the number of poor, landless peasants to 84.7% of all rural households in Indonesia and to 77.4% in the Philippines is a seemingly contradictory but direct result of economic growth and rising GNP. This paper examines how rising rates of economic output and expanding incomes are linked to pervasive unemployment and growing income disparities in these two countries. A growing national and international market for agricultural products, coupled with increased land productivity and the introduction of new technologies such as high-yielding seeds and fertilizers, has promoted high economic growth rates in the rural sectors. Simultaneously, high population growth rates, finite rural resources, the use of capital-intensive technology, and free market play in sales of productive resources discriminate against the rural poor. As land values spiral, credit tightens, and increased expenditures are required on technological inputs, poor rural households find it impossible to remain competitive and quickly lose their assets. Ownership of land and productive assets thus becomes concentrated in fewer hands while more small farmers and weak tenants join the ranks of the landless. Economic discrepancies are heightened as wealthy landholders enjoy easy access to credit, government programs, crop price supports, and heightened political influence. Meanwhile, the landless are locked in fierce competition with each other for the few available, but low-paying odd jobs. With displacement and pauperization, nutritional levels decline, jobs become scarcer, population growth rates remain high, and inequitable economic growth is exacerbated. These economic discrepancies are not, however, inevitable. Government policies can reverse inequitable ownership by promoting formation of cooperatives and by shifting credit accessibility to small borrowers. The promotion of low-cost and labor-intensive technology in addition to training opportunities in new skills can significantly reduce the plight of the landless and the effects of rural poverty. Urgent action is needed, for as the range of options diminishes, the current inequitable growth process threatens political and social stability.

AID/ta-BMA-8 931113700

Paper copy $17.68 Microfiche $ 2.16

Community cooperation can often mean the difference between project success or failure.

150 **PN-AAJ-652**

SOCIAL ANALYSIS OF A.I.D. PROJECTS: A REVIEW OF THE EXPERIENCE

Ingersoll, J.; Sullivan, M.; Lenkerd, B.
1981, 110 p.

Because the success of A.I.D. development assistance projects depends essentially on their social acceptability and appropriateness, A.I.D. has made social soundness analysis (SSA) a regular part of its project process. This comprehensive study of SSA was designed to identify the most useful features of SSA; determine ways in which A.I.D. procedures encourage or discourage the use of social analysis during the project design process; and recommend new guidelines for SSA for inclusion in the revised Project Assistance Handbook. Among the study's findings were: (1) at least 25% of the SSA's studied significantly influenced the design of proposed projects; (2) substantial differences exist in the quality and usefulness of first generation SSA; (3) A.I.D.'s new emphasis on careful design, implementation, and evaluation of projects produced a better working environment for SSA; and (4) although SSA incurs significant costs, costs may be greater for a project that failed due to a lack of SSA. Among the study's recommendations are: (1) SSA should remain an essential element in designing A.I.D. projects; (2) A.I.D. should disseminate SSA's shown to be exceptionally useful; (3) efforts should continue to integrate SSA into the entire project process, e.g., send SSA personnel to the field earlier and expand their tours of duty when confronted with complex social factors; and (4) A.I.D. should compare the costs of preparing different kinds of project analyses with the costs incurred when projects fail. Appended to the study is a list of revised guidelines to improve SSA. The guidelines require analysis of: (1) the primary problems of poverty and development addressed by a proposed project; (2) the project's basic goals, purposes, and assumptions; (3) the social environment that will affect and be affected by the project with emphasis on the difficulties to be expected; (4) an evaluation of local participation throughout the planning and implementation phases; (5) the distribution of costs and benefits among the target groups; and (6) the sustainability, replicability, and diffusion of project benefits.

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PN number		Quantity		Price/copy		Item Total
1. ☐☐–☐☐☐–☐☐☐	Paper copy	_____	×	$_____	=	$_____
	Microfiche	_____	×	$_____	=	$_____
2. ☐☐–☐☐☐–☐☐☐	Paper copy	_____	×	$_____	=	$_____
	Microfiche	_____	×	$_____	=	$_____
3. ☐☐–☐☐☐–☐☐☐	Paper copy	_____	×	$_____	=	$_____
	Microfiche	_____	×	$_____	=	$_____
4. ☐☐–☐☐☐–☐☐☐	Paper copy	_____	×	$_____	=	$_____
	Microfiche	_____	×	$_____	=	$_____
5. ☐☐–☐☐☐–☐☐☐	Paper copy	_____	×	$_____	=	$_____
	Microfiche	_____	×	$_____	=	$_____
6. ☐☐–☐☐☐–☐☐☐	Paper copy	_____	×	$_____	=	$_____
	Microfiche	_____	×	$_____	=	$_____
7. ☐☐–☐☐☐–☐☐☐	Paper copy	_____	×	$_____	=	$_____
	Microfiche	_____	×	$_____	=	$_____
8. ☐☐–☐☐☐–☐☐☐	Paper copy	_____	×	$_____	=	$_____
	Microfiche	_____	×	$_____	=	$_____
9. ☐☐–☐☐☐–☐☐☐	Paper copy	_____	×	$_____	=	$_____
	Microfiche	_____	×	$_____	=	$_____
10. ☐☐–☐☐☐–☐☐☐	Paper copy	_____	×	$_____	=	$_____
	Microfiche	_____	×	$_____	=	$_____

ORDER FORM

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12. ☐☐–☐☐☐–☐☐☐	Paper copy	_____	×	$_____	=	$_____
	Microfiche	_____	×	$_____	=	$_____
13. ☐☐–☐☐☐–☐☐☐	Paper copy	_____	×	$_____	=	$_____
	Microfiche	_____	×	$_____	=	$_____
14. ☐☐–☐☐☐–☐☐☐	Paper copy	_____	×	$_____	=	$_____
	Microfiche	_____	×	$_____	=	$_____
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	Microfiche	_____	×	$_____	=	$_____
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Hunger, Applied Research, and Institutional Outreach

"The challenge . . . of feeding a hungry world . . . is not to devise new ways by which the United States can feed the world but how to enable others to feed themselves."

—Dr. N. C. Brady
Senior Assistant Administrator
Bureau for Science and Technology
Agency for International Development

Hunger—chronic malnutrition—affects between 450 million and 1 billion people each year. In 1980, the Presidential Commission on World Hunger concluded that the most basic human right is the right to food and recommended "the United States make elimination of hunger the primary focus of its relationships with the developing countries beginning with the decade of the 1980's".

In a January 1981 response to the Commission, A.I.D.'s Technical Program Committee for Agriculture (TPCA) proposes that hunger be eliminated by "increasing food production and expanding purchasing power" of the hungry. Reasoning that most developing countries depend heavily on agriculture, the TPCA argues that agriculture must become the means to "create employment and raise income as well as produce food." As summarized in item 113 of this issue of *ARDA*, the TPCA recommends that A.I.D. make its antihunger efforts optimally effective by stressing the development of self-sustaining, indigenous research institutions capable of promoting viable small-farm production and marketing systems.

In further defining A.I.D.'s antihunger strategy, Dr. N. C. Brady, in a speech at the University of Maryland on World Food Day, October 17, 1981, stated that A.I.D. assists ". . . developing nations to strengthen their own institutional, scientific, and human capabilities to overcome their own food and hunger problems through solutions of their own choosing." In operational terms, A.I.D. ". . . provides technical assistance to developing countries in many fields . . ."; strengthens ". . . agricultural institutions and trains agricultural personnel, educators, and health workers."; and makes ". . . substantial investments in research by providing 25 percent of the annual support for the international agricultural research centers, and through collaborative research with U.S. agricultural universities."

Considering that more than one-third of the world's people depend on rice for roughly one-half of their protein and caloric intake, the International Rice Research Institute (IRRI) in the Philippines is an excellent example of the type of institution A.I.D. has in mind to help solve the world hunger problem.

Historically, investments in basic and applied research and in institutional outreach have generated high rates of return. Recall, for example, that during the Green Revolution, predictions of food self-sufficiency for developing countries accompanied introduction of the "miracle rices." And yet today, in spite of technological breakthroughs, rice production is not keeping pace with population growth. Why? In part, because farmers do not always accept the new varieties and because, even when they do, yields are one-third less than experimental results due to such production constraints as lack of access to seeds, fertilizers, pesticides, soil amendments, water control methodologies, storage facilities, and agricultural credit that viable development institutions could provide.

Perseverance in research and institutional support is evidenced in Study Number 44 of IRRI's Research Paper Series. This study, described in item 040 in this issue of *ARDA*, reports findings on a new rice variety—IR42—bred to outyield the miracle rices by reducing dependence on constraints beyond farmer control. In unfavorable environments in South and Southeast Asia, IR42 gave higher yields than earlier improved varieties in rainfed areas and in areas with soil nutrient deficiencies or toxicities. IR42 also demonstrated good resistance to a wide range of diseases and insects and exhibited better drought and submergence tolerance than its precursors.

Other papers in the IRRI research series announced in this issue describe progress in nitrogen fertilizers for rice (item 024), quality of milled rice (042), insect control methodologies (034), yield stability in problem soils (035), insect resistance (036), plant genetics in the host-parasite relationship (041) and a deepwater rice variety of Bangladesh (044).

But IRRI's institutional responsibilities and programs extend beyond research on improved rice varieties. IRRI also conducts research on such topics as the effects of the new rice technology on the use of family labor (015), changes in villagers' income distribution and community institutions (072), and causal connections between more than 20 years of climate and weather data and crop performance (002). IRRI also maintains a computerized germplasma data bank permitting automated retrieval of information on 41,000 cultivars in the world rice collection (001).

In addition, to ensure exchange of research results and related development information with other concerned international institutions, IRRI disseminates proceedings of symposia it cosponsors on such topics as the agrometeorology of rice production (003) and soil-related constraints to tropical food production (004). IRRI also publishes solely-sponsored texts such as item 043 which synthesizes for rice scientists the current knowledge on the crop physiology of rice and on attainment of high yields.

(continued on inside back cover)

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SUBJECTS AND DOCUMENTS OF SPECIAL INTEREST

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QUESTIONS AND ANSWERS ABOUT ARDA

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PREGUNTAS Y REPUESTAS SOBRE ARDA

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ARDA presenta informes de estudios de investigación actual y menos recientes financiados por A.I.D, informes del estado del arte, análisis del sector, evaluaciones especiales, y otros documentos que, juntos, describan un espectro ámplio de experiencia de desarrollo internacional

¿A quién dirijo preguntas adicionales sobre *ARDA*?

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AGRICULTURE

Symposium on the Agrometeorology of the Rice Crop. Symposium papers and working group discussions focused on the climatic aspects of rice production and the collection of weather data in rice-growing areas; the recent application of agrometereology to rice research and extension; the impact of climatic variability on rice production and the variables to be monitored in rice-weather experiments; and methods of rice-weather data analysis and application, such as mapping and crop modeling. A review of rice-growing countries' national weather records revealed that most data are collected by disparate subnational agencies and are therefore non-uniform in content and quality; that climatic data on regional crop yields are inadequate for monitoring and planning purposes; and that interaction between national meteorological and agricultural agencies is weak. It was recommended therefore that WMO assist national meteorological agencies to put raw weather data on magnetic tape for wider dissemination; that subnational, national, and international agencies cooperate closely in their meteorological services; and that regional climatic stations be installed/upgraded to adequately monitor area rice yields and climatic conditions. Further, WMO should coordinate a series of rice-weather experiments to collect a standardized set of weather, soil, and biological data for both wetland and dryland rainfed rice varieties. As to data analysis and modeling, it is recommended that WMO facilitate the collection of daily and hourly measurements of temperature, precipitation, solar radiation, evaporation, and wind for different-sized rice-growing areas and that the feasibility of using satellite data be studied. Future research should study the impact of meteorological conditions on rice crop diseases and pests and ways to mitigate the effects of catastrophic weather on rice production. A list of symposium participants is included.

Paper copy $32.63 Microfiche $3.24

004 **PN-AAJ-867**

PRIORITIES FOR ALLEVIATING SOIL-RELATED CONSTRAINTS TO FOOD PRODUCTION IN THE TROPICS

International Rice Research Institute (IRRI); Cornell University, College of Agriculture and Life Sciences.
1980, 471 p.

Conference co-sponsored by Cornell University and IRRI in cooperation with the University Consortium of Soils for the Tropics

Soil-related constraints and lack of sufficient agrotechnology to overcome them are among the most significant factors causing low crop productivity in tropical developing countries. This report presents the proceedings of an international symposium held at IRRI headquarters in the Philippines June 4–8, 1979, to discuss the occurrence and degree of knowledge of major soil constraints, future soil research priorities, and international collaboration in soil research. Two papers in the first section treat, respectively, soil constraints to agricultural development and the need for an internationally-coordinated soil research program. Next, a terminology for the exchange of scientific information is presented as background to the dicussion of the relation between major crop production systems and indigenous soil properties in tropical Africa, Southeast Asia, America, and India. The third section describes knowledge gaps in regard to soil acidity and salinity as well as soil deficiencies in nitrogen, nitrogen fixation, micronutrients, phosphorus, potassium, and sulfur; other soil constraints to crop production (water stress, soil erosion, mechanical impediments to land preparation and root growth); and soil fertility evaluation and extrapolation of research. In all, 21 papers were given with a discussion period following each presentation. Suggestions for future research were divided into three ecological zones: humid tropics (savanna and rain forest), tropical wetlands, and the semiarid tropics. Research topics for all three groups that should be priorities in the near future are: soil acidity and salinity, soil chemical composition, crop micronutrients, drought, soil erosion, and soil fertility evaluation and extrapolation. Symposium participants agreed to create a small international organization to coordinate soil research by compiling and disseminating soil information, inventorying problems and setting research priorities, and strengthening national research capabilities through training programs and conferences. A list of symposium participants is appended; concluding each participant's paper is a bibliography.

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005 **PN-AAJ-063**

LAND USE IN THE ANDES: ECOLOGY AND AGRICULTURE IN THE MANTARO VALLEY OF PERU WITH SPECIAL REFERENCE TO POTATOES

Mayer, E.
International Potato Center (CIP).
1979, 112 p.

To tailor agricultural programs to the unique aspects of different areas in Peru's Mantaro Valley, this report identifies and maps the valley's major land-use patterns and ecological characteristics, with special reference to potatoes. The region's natural environment is described as well as its land-use patterns, social structures, and predominant farm units. To prepare the map, the valley was classified according to altitude (high, intermediate, low), type of enterprise (peasant or commercial), condition of land (dry or irrigated), and dominant crops cultivated. Overall, land use in the Mantaro Valley reflects the interaction of two major variables: ecology and types of enterprise. Variation in agriculture follows ecological principles: the higher areas are restricted to a few specially adapted crops, while as one moves down, crop diversification increases, rotation cycles become longer, and fallow cycles diminish and disappear. Land use depends largely on farmer location, needs, and resources. Commercial farms tend to be concentrated in the low altitude zone where land is better suited for large-scale, mechanized production. Peasant farmers dominate the upper

two altitude zones where they often supplement their subsistence base with cash crops. Potatoes are the major crop in the valley and are grown in each of the three zones. One of this report's most significant discoveries is the importance of peasant enterprises to national potato production; it was found that while market-destined potato production is carried out by commercial enterprises in the low zone, in the intermediate zone it is done by peasant farmers. Included among this report's recommendations are that the quantity and quality of fertilizer applied to potatoes should relate to 3- or 4-year cropping cycles, not to single crops of potatoes; that additional research should be conducted on technical and socioeconomic aspects of fallowing before specific recommendations are made for improving the area's existing system; and that to improve potato production, it is necessary to view the potato in relation to the area's other crops and to potato farmers. Appended is a 51-item reference list (1948–77) in English and Spanish.

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Paper copy $14.56 Microfiche $2.16

006 **PN-AAJ-152**

"LEUCAENA LEUCOCEPHALA": AN EXCELLENT FEED FOR LIVESTOCK

Benge, M.D.
A.I.D., Bureau for Development Support, Office of Agriculture.
1980, 28 p.

Agriculture Technology for Developing Countries, Technical Series Bulletin No. 25

Leucaena leucocephala (LL), a leguminous tree native to Central America, is extremely well-suited to the seasonally dry tropics. It can be fed fresh, or as leaf meal, silage, or browse to cows, goats, chickens, and a variety of fish. This report describes characteristics, uses, and planting procedures for LL. *Leucaena*'s many varieties, of which the "Giants" (K-8, K-28, K-67) are the most promising, are fast-growing, rugged, drought resistent, and because *Rhizobia* live in a symbiotic relationship with the plant's roots, are able to fix nitrogen from the air. LL is a superior forage to alfalfa in terms of both nutritive value (vitamin A and protein) and digestability and can yield up to 20 tons of dry matter per hectare per year. Although LL also contains mimosine, a toxic alkaloid, ruminants can still be fed a continuous ration of 40% LL, and non-ruminants thrive on 5–10% LL without adverse effect. A new, low-mimosine LL is being developed and should be available soon. LL-planted pastures can support up to 2.5 cows per ha, but both overgrazing and overgrowth must be checked. LL is an effective weapon against soil erosion and serves to suppress noxious weeds. For fields and planted pastures it is desirable to interplant LL with Guinea, Bermuda, Dallis, Pangola, or Kenya Sheep grass to reduce weed growth, increase ground water levels, and provide a more balanced forage. For marginal, hilly, or very dry land, it is preferable to plant LL, allow growth, cut the plants back to stumps, allow regrowth, and underplant with a shade-resistant grass such as Guatemala grass. LL requires adequate phosphate, potash, sulfur, cobalt, and molybdenum; high amounts of magnesium; and low levels of calcium. Large, dense seeds should be chosen, then scarified, and innoculated with *Rhizobium*. Pelletization (coating with fertilizer) is also recommended. Although direct seeding is more efficient, seedling propagation/replanting is also common. With 100% germination, 1 kg of seeds planted 1 m apart will sow a 9 ha field. In either case, seedlings should be pruned to reduce dieback and evapotranspiration. A 19-item bibliography (1942–78) is appended.

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007 **PN-AAJ-558**

EXPERIMENTAL DESIGNS FOR PREDICTING CROP PRODUCTIVITY WITH ENVIRONMENTAL AND ECONOMIC INPUTS FOR AGROTECHNOLOGY TRANSFER

Silva, J.A.
University of Hawaii, College of Tropical Agriculture and Human Resources, Department of Agronomy and Social Science.
1981, 184 p.

Departmental Paper 49

A.I.D.'s Benchmark Soils Project (BSP) was developed to help developing tropical countries improve basic food crop production through a soil classification system and the transfer of successful agrotechnology. The papers in this compilation were presented at the Workshop on Experimental Designs for Predicting Crop Productivity with Environmental and Economic Inputs, held May 20–24, 1974 at the University of Hawaii and are arranged in three categories. The first section explains BSP's objectives and its use of the U.S. Soil Taxonomy System to classify the soils tested in BSP experiments. This section also details the methodology of BSP experiments describing site and crop selection procedures and the stable and variable factors affecting soil and climate. The main objectives of the experiments were to prove the transferability of crops raised in similar soils and to develop a universal equation describing yield response for any one soil given appropriate variables. Papers in the second section describe approaches to, and results from, BSP field experiments. It was suggested that those proposing BSP fertility experiments should both determine: the country soil situation and the extent of tests appropriate for soil variables (nitrogen, phosphorus, potassium, stand, irrigation, etc.) and specify the variables and statistical and economic models used in applying the test results. Cornell University's nitrogen and phosphorus soil experiments proving the high production potential of well-drained acid soils in the tropics are reviewed. The third section includes descriptions of experimental designs suitable for soil fertility experiments. Prediction equations and other mathematical models for estimating optimal inputs and outputs are discussed and recommendations

are made for improving their utility. Topics include the successful extension in Japan of a fractional factorial design for a fertilizer experiment to 20 crop characteristics such as culm length, number of panicles per ear, etc., and economic aspects of production functions for soils such as the derivation of yield and profit functions for sugarcane. Bibliographies are appended to each paper and a list of workshop participants is provided.

AID/ta-C-1108 931582000

Paper copy $23.92 Microfiche $2.16

008 **PN-AAJ-562**

ROOTS AND TUBERS: A POST HARVEST BIBLIOGRAPHY

Idaho University, Postharvest Institute for Perishables.
1981, 143 p.

Idaho University's Information Center of the Postharvest Institute for Perishables (ICPIP) was created in 1980 to globally disseminate up-to-date information on reducing postharvest losses of roots, tubers, fruits, vegetables, nuts, oilseeds, and spices. This bibliography on roots and tubers is the first in a semiannual series of bibliographies of documents available from ICPIP. Approximately 270, mostly post-1970, predominantly English-language items are listed in the following five subject areas: (1) root and tuber biology—biological, chemical, and physical properties, insects and microorganisms, and chemical and biological control of pests; (2) the economics of roots and tubers—marketing facilities and operation, domestic and international trade, loss assessment, livestock feed, and analyses of various economic models; (3) engineering aspects of root and tuber culture—conditioning, curing, harvesting, processing, storage, packaging, irradiation, drying, utilization, quality control, and appropriate technology; (4) training and education related to roots and tubers—symposia, courses, handbooks, and manuals; and (5) miscellaneous topics relating to roots and tubers—rural development, social change, nutrition, and consumer acceptance. The following information is provided for each item: title, author, source and language of the document, the subjects covered in the document, pagination, and date. Paper or reduced (24x) microfiche copies of documents listed in this bibliography are available from ICPIP free of charge to requestors from developing countries or at cost to those from developed countries. Coding sheets and order forms are included.

AID/DSAN-CA-0265 931132300

Paper copy $18.59 Microfiche $2.16

009 **PN-AAJ-121**

SWAZILAND CROPPING SYSTEMS RESEARCH AND EXTENSION TRAINING DESIGN STUDY

Allred, K.R.; Farnsworth, W.F.; Downes, J.D.
Consortium for International Development.
1980, 126 p.

As background for an A.I.D. project to assist the Swaziland Ministry of Agriculture (MOA) to increase the self-sufficiency of Swazi small farmers on Swazi Nation Land (SNL), this three-part report outlines needs and strategies in the areas of cropping system research and training of MOA extensionists. The first two sections are prepared, respectively, by an agronomist and a cropping systems specialist. These sections review, in the context of Swaziland's general agricultural situation, cropping systems currently used by small farmers; and cropping systems' research needs in terms of facilities, equipment, commodities, and staff. Recommendations regarding cropping systems research include identifying production constraints to be considered by the A.I.D. Project Paper team; expanding experimental research by developing and testing several applicable and economically feasible cropping systems (crops and cropping systems are detailed); providing sufficient scholarships at the B.S. and M.S. levels to satisfy the program's requirements for research personnel and restaffing and expanding the MOA's Research Division to allow it to participate in onfarm cropping systems research; preparing simplified versions, directed to needs of small farmers on SNL, of annual reports on cropping systems research; and including local farmers in the decisionmaking and testing process. The report's third section, prepared by an agricultural education and extension training specialist, analyzes the MOA's Certificate Training Program for extensionists and makes recommendations to improve it. Recommendations for USAID assistance include upgrading the Program's curriculum and facilities and expanding the staff, and developing a vigorous in-service training program for extension field officers, middle management, etc. Also recommended are improving MOA extension services by producing bulletins and pamphlets on research findings for use by extensionists and providing additional support, training, and equipment for MOA's Information Division. Each of the three sections specifies technical assistance to be provided by the proposed A.I.D. project and concludes with a list of references. Appendices include lists of Swaziland contacts and a pamphlet on programming in the cooperative extension service.

AID/SOD/PDC-C-0217 645021200

Paper copy $16.38 Microfiche $2.16

010 **PN-AAG-167**

AN ANALYSIS OF GRAIN STORAGE IN THREE INTERIOR SAHEL COUNTRIES

Pinckney, A.
University of Michigan, Center for Research on Economic Development.
1978, 78 p.

Discussion Paper 75

Marketing expected increases in foodgrain production will require viable grain storage systems in Mali, Niger, and Upper Volta. This report analyzes current grain storage systems in the three Sahelian countries and raises key policy issues. In Mali,

domestic grain is transported to an arrondissement and then to provincial storage centers whose estimated national capacity is 130,000 metric tons (MT). The State Marketing Board, OPAM, transfers 8% of all millet and 30% of rice to widely used central warehouses. While this system saves money, the lack of decentralized warehousing increases transport burdens on suppliers and leads to an unquantified loss of grain in shipping. Mali has no current (1978) grain reserves. In Niger, responsibility for storing grain lies with the National Grain Agency (OPVN), which stores 90% of all grain collected, the rest being stored by local co-ops. Arrondissement storage capacity is estimated at 9,000 MT and total OPVN capacity is 70,000 MT. Niger has 15,000 MT of millet and sorghum on emergency reserve. Although grain storage in Upper Volta officially rests with the Regional Development Office (ORD), two other national agencies control significant amounts of the nation's total storage capacity and reserves. While precise statistics are lacking, it is estimated that ORD's capacity is 20,800 MT and that of the other agencies 37,000 MT. Upper Volta enjoys a 6-week grain reserve. All three countries need to quantify grain reserve capacity and grain losses, end the fragmentation of authority in the storage sector, and bring uniformity to storage facilities. Other issues facing the three countries are: (1) the level at which new investments in storage infrastructure should be initiated (onfarm, community, or national); (2) tradeoffs in national grain reserve policies between efficiency and welfare and between recipients; (3) the composition of grain reserves (i.e., percentage of each grain variety relative to another) and the implications for different grain producers; and (4) questions concerning price policy coordination, institutional structure, appropriate storage technology, and location of facilities in Sahelian long-term grain reserve programs.

AID/afr-C-1143 GTS 625092900

Paper copy $10.14 Microfiche $1.08

011 PN-AAJ-036

FOOD PRODUCTION PROBLEMS OF SMALL FARMERS IN LOW-TECHNOLOGY NATIONS: SOME EVIDENCE FROM NIGERIA

Awa, N.E.
Cornell University, Department of Communication Arts.
1980, 17 p.

Cornell International Agriculture Mimeograph No. 79

Small farmers' disinclination to adopt government policies to increase agricultural production should not be viewed as demonstrative of inherent conservatism but rather as a rational response to perceived risks and problems. Thus concludes this case study on Nigerian farmers' reaction to the Government of Nigeria's (GON) efforts to promote use of such innovations as fertilizer, pesticide, and new crop varieties. Data gathered from 172 small yam, cassava, rice, and cowpea farmers in Nigeria's East Central and Southeast States showed that credit nonavailability and the lack of agricultural infrastructure were major constraints. Borrowing from friends and family is still practiced for production credit, but there is also a growing class of professional moneylenders who charge high interest rates and enforce rigid contracts. Although State government lending institutions have been established, they are slow, highly selective, graft-ridden (bribes often equal one-third of the loan), and demand detailed information farmers often lack. No money, inadequate knowledge, and high risk were viewed as major constraints to obtaining State credit by 68.6%, 42.4%, and 30.8% of the respondents, respectively—only 4 farmers (2.3% of the sample) had procured State loans. In the case of infrastructure, lack of basic agricultural support services—roads, public transport, clean water, electricity, etc.—reduced farmers' adoptive behavior. This "lack of supply" combined with a "lack of funds" were cited by 55.5% and 51% of the respondents as major disincentives, while risk and non-use by neighbors were deemed critical by only 2.3% and 1%, respectively. This supports previous findings that the GON often raised farmers' expectations but failed to later provide promised inputs (e.g., seeds). Thus, even if farmers were able to obtain credit and grow a larger crop, poor roads and the lack of public transport would result in local sales flooding the market and further depressing already low prices. The author concludes that price supports and ancillary services must be provided to make higher production profitable and permit GON production targets to be met. A 17-item bibliography (1962–77) is appended.

AID/ta-BMA-8 931113700

Paper copy $2.21 Microfiche $1.08

012 PN-AAJ-037

A METHOD OF WATERSHED LAND CLASSIFICATION AND ASSESSMENT FOR THE TROPICS: A CASE STUDY OF RIO GUANARE, VENEZUELA

Hawes, R.A.; Hamilton, L.S.
Cornell University, College of Agriculture and Life Sciences.
1980, 33 p.

Cornell International Agriculture Mimeograph No. 77

To avoid environmental degradation while developing natural resources in the tropics, an adequate appraisal of existing land resources is prerequisite. Adequate appraisal—which must be simple, flexible, technically sound, and quickly executed—involves assessing an area's major environmental components, delineating relatively homogeneous environmental units which tend to respond uniformly to a given treatment, and describing local prevailing or likely land use practices. This report describes the methodology used in an appraisal, carried out largely by one person over a 20-month period, of the 157,000 ha of Venezuela's Rio Guanare region. To provide a framework for assessing biotic performance capabilities, Rio Guanare's upper and middle watershed area of plains, piedmont, and bedrock-controlled mountains was divided into five tropical forest bioclimate zones: (1) dry, cleared for cultivation or grazing; (2) moist, cleared for permanent agriculture; (3) pre-

montane moist, cleared for permanent agriculture or burnt for grazing; (4) premontane wet, with a diverse vegetative cover; and (5) lower montane wet, a mixture of forest and grassland. To determine broad land zones, this framework was applied to geological materials taken from maps, aerial photographs, and field studies. The resultant 46 land types were rated for their present suitability for the production of five crop types (coffee, bananas, maize, citrus, and cassava), grazing, watershed protection, and the production of timber, firewood, or commercial forests. The five ratings (from highly suitable to permanently unsuitable) correspond to those of the Food and Agriculture Organization. In contrast to earlier, more pessimistic area studies, about 36% of the land was rated as being high to moderately suitable for some type of agriculture, mainly coffee production. Included in forestry-related findings were that 16% of the watershed is in critical condition and should remain forest and that only 10% of the area is suitable for fuelwood production. Areas and species permanently non-suitable for various activities are specified and the need to account for such non-suitability in planning is stressed. Appendices include a 21–item Spanish and English bibliography (1958–80).

AID/ta-BMA-8 931113700

Paper copy $4.29 Microfiche $1.08

013 **PN-AAJ-230**

PRE-PROJECT ASSESSMENT OF THE AGRICULTURE AND RURAL DEVELOPMENT SECTOR IN THE PEOPLE'S REPUBLIC OF THE CONGO; FINAL REPORT

Hung, G.N.; Downs, R.E.; Alfaro, J.F.; Biddier, W.K.; Barbour, R.
Development Associates, Inc.
1980, 255 p.

Although the Congolese government has pursued industrial and urban development at the expense of rural development for nearly 20 years, agriculture will remain the foundation of the Congolese economy when known oil reserves—the spearhead of industrial development—are depleted by the late 1980's. To help restore viability to the Congolese small farm sector, this report, divided into five sections, assesses the sector and proposes a medium- and long-term strategy for A.I.D. assistance. Part I summarizes the historical, sociological, demographic, economic, and financial conditions impacting on agricultural development. Part II reviews the agronomic, engineering, performance, and marketing aspects of the shrinking agricultural sector. Part III looks at the targeted population of small farmers— their backgrounds, income, production, cooperative organizations, and socioeconomic participation—as well as past international assistance provided to the small farm sector. Part IV details constraints to agricultural development, specifically identifying environmental, cultural, financial, marketing, transport, and administrative limitations. Thus, an optimal U.S. strategy of assistance, as outlined in 18 proposed projects in Part V, would be: (1) designed with the medium-term (1–3 yrs) objective of improving agricultural marketing and preparing for future rural development and the longer-term (3–5 yrs) goal of increasing productivity, diversifying agriculture, and improving rural infrastructure; (2) in the form of P.L. 480, Title I grants and concessional loans; (3) experimental and investigative in nature in order to provide information needed to plan future assistance; (4) divided so that two-thirds of the aid is allocated to the southern regions, one-third to the northern regions; (5) channeled to small farmers either directly or through cooperatives or pre-cooperatives, not through state farms or ranches; and (6) initially favor food, cash crop, fish, and livestock production and marketing at the expense of forestry and agroindustrial production. Appended is a 64-item bibliography (1947–80) of French and English references.

AID/SOD/PDC-C-0158

Paper copy $33.15 Microfiche $3.24

014 **PN-AAJ-219**

FURTHER MECHANIZATION OF EGYPTIAN AGRICULTURE

ERA 2000, Inc.
1979, 639 p.

Agricultural mechanization in Egypt stands at a crossroads from which the Government of Egypt (GOE) must decide whether to aggressively intervene or pursue a laissez-faire strategy. This study, aimed to assist the GOE to select the optimal strategy and to highlight possible avenues of A.I.D. assistance (herein proposed at $78.8 million for 1980–84), concludes there exists in Egypt the foundation for a vigorous expansion of mechanization which could increase farm production 47% by 1990 with only a neglible adverse social impact. After providing a brief outline of the history and current status of agricultural production and mechanization in Egypt; offering information on labor, machinery, and power requirements and costs; and exploring farmers' attitudes toward mechanization, the authors report the costs and benefits of mechanizing production of cotton, maize, wheat, rice, sugarcane, and berseem. Specifically, the most promising opportunities for increased production are seen to be improved seedbed preparation, more timely planting, increased subsoil coverage and precision levelling, replacing animal-drawn sakias (water wheels) with mechanical pumps, diversifying the use of tractors, and increased use of thresher/winnowers and mechanical grain harvesters. To follow through on these opportunities will require a significant increase in the number and types of equipment, especially tractors, subsoiling/land-levelling equipment, self-powered thresher/winnowers and mower/binders, motor-driven pumpsets, and new types of land preparation, planting, and cultivation equipment. To improve the agricultural support system and thereby glean the maximum gain from mechanization, the authors recommend upgrading machine management, improving repair facilities, modernizing local capacity for farm equipment manufacture, expanding farm mechanization research and development, increasing the sup-

ply of trained mechanics and spare parts, and developing an effective management information system. A proposed budget is included outlining possible A.I.D. assistance in the recommended farm mechanization program.

AID/ne-C-1513 263002500

Paper copy $83.07 Microfiche $7.56

015 PN-AAJ-083

THE EFFECT OF NEW RICE TECHNOLOGY ON FAMILY LABOR UTILIZATION IN LAGUNA

Smith, J.; Cascon, F.
International Rice Research Institute (IRRI).
1979, 17 p.

In IRRI Research Paper Series, No. 42

To fill a research gap on the impact of modern rice varieties (MV) in developing countries, this paper analyzes four surveys (1965, 1970, 1975, and 1978) of 45 farmers with atypical, high-yield farms in Laguna, the Philippines, to estimate the impact of the 1966 introduction of MV's on family labor use. The study showed a general change from labor-intensive to labor-saving practices (i.e., the use of chemicals and machinery) after 1975, as farmers adjusted to changing factor price ratio's. Further, family labor declined steadily throughout the entire period of the study. To explain this decline, a Cobb-Douglas production function was used to test a hypothesis that MV's increase the number of operations that require large amounts of hired help to meet set deadlines, e.g., weeding, thus making hired operations more important than family operations in increasing output. Regression analyses showed that a 1.0% increase in hired labor could increase output by 0.2% using MV's, but would hardly affect output using older varieties; and that, conversely, a 1.0% increase in owner operator's labor (the chief component of family labor) could increase output 0.12% using older varieties, but have no marked impact using MV's. The study also revealed that total operator's labor decreased nearly one-third; that a significant portion of this time was spent growing watermelon, a lucrative crop; and that farmers spent much less time in non-farm activities and much more time in a wide range of farm management activities such as touring paddy fields and meeting with extensionists and rural bank personnel, with a significant (5%) increase in farm management production elasticity. The study also showed that the increased availability of nonfarm work, mainly in factories, decreased onfarm family labor. As of 1978, 60% and 53%, respectively, of male and female children over 18 held such jobs. Finally, the study revealed that total farm income increased 53% in real terms, resulting in an increased capacity to hire manual laborers. Taken together, these changes in labor use are similar to those that occurred over a 40-year period in Japan and Taiwan. An appendix on regression tests and 9 references (1961–79) are included.

AID/DSAN-G-0083

Paper copy $2.21 Microfiche $1.08

016 PN-AAJ-221

POTATO PRODUCTION AND UTILIZATION IN KENYA

Durr, G.; Lorenzl, G.
Centro Internacional de la Papa; University of Nairobi, Department of Agricultural Economics; Technical University Berlin, Institute of Socio-Economics of Agricultural Development.
1980, 133 p.

As part of a series of studies being conducted by the International Potato Center on the production, marketing, and use of potatoes in developing countries, this report describes the history of Kenya's potato industry and makes recommendations to improve it. Production and use of potatoes have expanded rapidly since potatoes were first grown in Kenya, over 70 years ago, primarily by European farmers for their own community and for export. Although potatoes are a relatively unimportant crop nationally in terms of both total agricultural production and per capita caloric intake, an uneven distribution of consumption and production makes them an important food crop and/or consumer item in some areas. Production occurs mainly in the central highlands and consumers are located mainly in these and in urban areas. Potatoes are grown by small subsistence farmers primarily for home consumption, by large commercial growers in the Meru district, and by forest cultivators who plant potatoes in slash and burn plots for a year or two prior to growing maize. Yields for small farmers are generally low due to poor seed quality, inadequate disease and pest control, and low soil fertility. Certified seed is not widely used because of its expense, the long maturing time and low marketability of available varieties, and the difficulty of obtaining seed in time for planting. In urban areas, potatoes are widely accepted but relatively costly in comparison to other staples such as maize, rice, and beans. Recommendations to improve commercial production of potatoes include determining consumer preferences in appraising the quality of potatoes; alleviating price fluctuations by providing better storage facilities; and intensifying production through selective mechanization of planting and harvesting, use of improved seed of marketable varieties, and crop rotation. Recommendations for subsistence farmers include improving onfarm storage and intensifying production, especially through technologies not requiring capital investment. An appendix discusses the objectives and methodology of the potato producer and trader surveys. A 65-item list of references (1938–79), containing one item in German and the others in English, is included, along with 54 illustrated tables.

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Paper copy $17.29 Microfiche $2.16

AGRICULTURE

017 **PN-AAJ-073**

FOOD POTENTIAL OF AQUATIC MACROPHYTES

Edwards, P.
International Center for Living Aquatic Resources Management (ICLARM).
1980, 53 p.

ICLARM Studies and Reviews 5

The only aquatic plant that is also a major agronomic species is the emergent macrophyte rice, *Oryza sativa*, the world's most important single crop and a staple in the diet of more than 50% of the world's population. To facilitate the use of other aquatic macrophytes (AM) in food production, this paper reviews existing literature for methods to convert AM's, generally thought of as weeds and thus warranting destruction, into human food, livestock fodder, fertilizer, and herbivorous fish food. The potential for integrated AM-herbivorous fish systems and the possible health hazards associated with aquatic macrophyte cultivation are also reviewed. Loosely defined, AM's are aquatic plants which grow in water or in soils covered with water for a large portion of the growing season in tropical and semitropical areas. Since AM's may be cultivated in water-logged or swampy soils not suitable for either terrestrial crops or aquaculture, their cultivation increases the amount of productive land in a given area. Although more than 40 AM species are edible, only certain ones (taro, Chinese water chestnut, water spinach, and *Neptunia oleracea*) have clear potential for widespread use due to the social unacceptability and cost inefficiency of most varieties. Water spinach and *N. oleracea* are identified as the most promising varieties, and further research on their protein content and yield capacity is recommended. Given their high moisture content, however, AM's are not economically feasible livestock fodder because their low nutritive quality does not justify the harvesting, transporting, and processing costs required to convert fresh plants into dry feed. The most promising fertilizer use of AM's is composting in fish ponds, and further research on the use of AM's and slurry in biogas production is recommended, as is study of the feasibility of stocking herbivorous fish to control AM's in irrigation systems with large macrophyte populations. While the presence of AM's may lead to mosquito breeding, contamination from the use of animal and human wastes as fertilizer and the accumulation of toxic chemicals by AM's in waste recycling systems are more likely AM-related health hazards. Recommended countermeasures, respectively, are rendering wastes innocuous prior to use and separating domestic from industrial wastes. A 202-item list of references (1918–80) is included.

AID/DSAN-G-0174 931112400

Paper copy $6.89 Microfiche $1.08

018 **PN-AAJ-074**

PHILIPPINE MUNICIPAL FISHERIES: A REVIEW OF RESOURCES, TECHNOLOGY, AND SOCIOECONOMICS

Smith, I.R.; Puzon, M.Y.; Vidal-Libunao, C.N.
International Center for Living Aquatic Resources Management (ICLARM); Republic of the Philippines, Ministry of Natural Resources, Fishery Industry Development Council.
1980, 89 p.

ICLARM Studies and Reviews 4

International interest in the socioeconomic development of traditional small-scale fisheries has grown rapidly in the last 10 years. This report, first in a series of country reviews, describes the current status of Philippine municipal fisheries. Six areas are discussed: (1) Sector Overview: Although small-scale municipal fishermen (MF) annually provide 55–60% of the Philippine fish catch, their incomes are dwindling due to declining fish resources and rapid inflation. Recent surveys show MF incomes to be half the established poverty threshold. (2) Resources: Contrary to earlier views, evidence suggests that

Four aspects of Philippine municipal fisheries: mixed gill net catch, ownership; and a retail market, emphasizing the market rather than th

traditional fishing waters are being overfished and that maximum sustainable yields have been reached. (3) Technology: Traditional fishing methods are still widely used by MF; less than half possess motorized vessels. Technological research has been limited and aimed mostly at upgrading gear and vessels. (4) Socioeconomics: Statistical correlations show that successful MF are better educated but also more dissatisfied with their living conditions. Nearly half want to shift from fishing to another occupation. Those seeking a change, however, are younger, less educated, and poorer. (5) Development Programs: The two major developmental thrusts are increased production and improved marketing. For example, credit programs have helped MF acquire improved vessels, engines, and gear. Marketing projects have stressed the establishment of a nationwide cold storage network to speed distribution and reduce spoilage. (6) Management and Research: Because of overfishing trends and conflicts between commercial and municipal fishermen, steps are being taken to manage or restrict fishing, e.g., large vessels are prohibited from some coastal or shallow waters. Incentives to reduce fishing are needed to keep MF's from being further impoverished. Further research efforts should emphasize analytical and statistical studies aimed at

ch landings for bancas; fishing village with little if any land sistence orientation of municipal fisheries.

understanding the dynamics of municipal fisheries, especially regarding MF's low standard of living. Appendices include a 99-item bibliography (1950–80) and research recommendations of the Philippine Council for Agricultural and Resources Research.

AID/DSAN-G-0174 931112400

Paper copy $11.57 Microfiche $1.08

019 PN-AAJ-075

REVIEW OF BREEDING AND PROPAGATION TECHNIQUES FOR GREY MULLET, "MUGIL CEPHALUS" LINNAEUS

Nash, C.E.; Shehadeh, Z.H.
International Center for Living Aquatic Resources Management (ICLARM).
1980, 88 p.

ICLARM Studies and Reviews 3

Although the size, nutritional quality, fecundity, and adaptability of mullet, especially grey mullet (*Mugil Cephalus* L.), indicate their potential as a major source of animal protein in the world's tropical and subtropical coastal areas, mullet have yet to be successfully bred in captivity. This state-of-the-art report provides a compendium of knowledge on mullet propagation. Given the historical non-intensive cultivation of mullet in the Mediterranean, Southeast Asia, Taiwan, Japan, and Hawaii, as well as more recent experiments in intensive mullet cultivation—the forerunner to any large-scale operation, the authors suggest that pilot mullet hatcheries are now justified. Toward this end, they outline both natural spawning and induced breeding techniques for mullet, including information on broodstock selection, spawning behavior, egg morphology and incubation, induced maturation, larval behavior and nutrition, and postlarval development. Although it appears mullet do not breed in any specific environmental pattern, successful breeding does require a substantial quantity of healthy, sexually mature broodstock; appropriate temperature and photoperiod to influence physiological changes in the pituitary gland and gonads; and artificial conditions to permit the female to develop oocytes beyond tertiary yolk globule stage and to allow the male to complete spermiogenesis. To meet these needs, the authors provide a detailed description of hatchery techniques—broodstock collection, maintenance, and spawning; fertilization, incubation, and hatching; larval rearing; production of food (photoplankton, rotifer, copepod, amphipod, and brine shrimp); and facility staffing. Requirements for hatchery design—size, site, materials, construction, and equipment—are addressed. Although shortages of purified salmon gonadotropin (a hormonal stimulant) and brine shrimp (an important larval food) could constrain future mass production of mullet, the authors remain confident that mullet have the greatest potential of all the marine and brackishwater finfish for becoming humankind's most important supplier of aquatic animal protein. Appended are a 180-item bibliography (1916–78), a list of hatchery equipment, and information on a technical training film

AID/DSAN-G-0174 931112400

Paper copy $11.44 Microfiche $1.08

020 **PN-AAJ-280**

INTEGRATED AGRICULTURE-AQUACULTURE FARMING SYSTEMS

Pullin, S.V.; Shehadeh, Z.H.
International Center for Living Aquatic Resources Management (ICLARM); Southeast Asian Regional Center for Graduate Study and Research in Agriculture.
1980, 265 p.

ICLARM Conference Proceedings 4

Although integrated agriculture-aquaculture (IAA) farming has been practiced in Asia for centuries and offers more efficient resource utilization, reduces risk by diversifying crops, and provides additional food and income, reliable quantitative production and management guidelines have yet to be produced and disseminated for use as a basis for development programs. This report on the proceedings of the Fourth International Center for Living Aquatic Resources Management Conference (ICLARM 4) addresses this need. The conference was held 6–9 August 1979 in Manila, Philippines and was cosponsored by ICLARM and the Southeast Asian Regional Center for Graduate Study and Research in Agriculture. The conference's goals were to: (1) provide an overview of current IAA farming practices in selected Asian countries; (2) increase awareness of IAA's ability to raise farm income; (3) review available experience and technology; (4) discuss IAA's socioeconomic aspects in order to identify research and development priorities; and (5) encourage governments and international donors to initiate IAA research and development projects. The report consists of 24 papers, 10 of which review broad strategies, techniques, and problems associated with IAA, such as aquaculture in rice fields and irrigation systems; the role of pesticides and health as constraining factors; and the use of animal wastes in pond management. The other 13 papers were presented as case studies on current IAA practices in Hong Kong, Hungary, India, Indonesia, Japan, Malaysia, Nepal, the Philippines, Taiwan, and Thailand. A final paper highlights the needs for research on both IAA farming systems in general and on the major factors affecting IAA performance—energy, materials, space, time, and information. Many of the papers are detailed studies, supported by charts, data, pictures, diagrams, and maps; and most are referenced with bibliographies on sources of information on IAA. A list of the authors and of the conference participants is appended.

AID/DSAN-G-0178 931105000

Paper copy $34.45 Microfiche $3.24

021 **PN-AAJ-022**

MEXICO: THE FERTILIZER INDUSTRY

Allgood, J.H.; Braude, D.; Harris, G.; Hill, J.M.; Smith, R.T.; Marquez, A.V.; Alvarez, J.D.; Ariaga, A.M.P.; Ramirez, F.D.
International Fertilizer Development Center (IFDC); Fertilizantes de Mexico (FERTIMEX).
1979, 60 p

A rapidly expanding domestic fertilizer market and a desire to capitalize on indigenous raw material deposits have resulted in Mexico's rapid emergence as a major fertilizer producer. This report reviews Mexico's fertilizer industry in terms of its past progress, its current resources, and its future plans for producing an adequate supply of fertilizer to meet the country's need for increased crop production. During the past decade, fertilizer use in Mexico has nearly doubled, exceeding a million metric tons (MT) of plant nutrients in 1978; it is expected to double again by 1985. Fertilizer production has also increased, with total outputs estimated at over 1.65 million MT of nutrients in 1978 versus only 0.7 million MT in 1970. Mexico's position as a net importer of nitrogen has thus been reversed, with the 1978–85 annual export potential estimated at 508,000–1,381,000 MT of nitrogen. Mexico's petroleum resources are estimated to be among the world's largest, thus insuring that nitrogen for feedstock is available. Mexico's exports of phosphates should peak in 1983 at over 350,000 MT after declining to about 100,000 MT in 1980 and 1981 due to increased domestic demand. Phosphate rock for fertilizer production must currently be imported, but deposits in Baja California are being investigated for exploitation in the 1980's. To increase fertilizer production, 11 major development projects are planned or are being implemented. These include two projects to produce potash, which is now totally imported. Most fertilizer production is under the control of two government agencies, Petroleos Mexicanos, S.A. (PREMEX), which produces ammonia, and FERTIMEX, which is responsible for producing and marketing all other fertilizers. It is government policy to make fertilizers readily available to farmers at the lowest possible price, and in recent years prices have been lower than those in other countries such as the United States and India. FERTIMEX is expanding its distribution system in order to better meet the needs of small farmers, and progress in being made in coordinating research and extension activities. Eight references (1973–79) in Spanish and English are included.

AID/ta-G-1218 931005400

Paper copy $7.80 Microfiche $1.08

022 **PN-AAJ-023**

BOLIVIA FERTILIZER SITUATION AND RECOMMENDATIONS

Frederick, M.T.; Smith, R.T.
International Fertilizer Development Center (IFDC).
1979, 85 p.

The second lowest level of fertilizer consumption in South America and exorbitant fertilizer prices are impeding Bolivia's agricultural development. This report reviews Bolivia's fertilizer situation and makes recommendations to improve it. Examined are Bolivia's agricultural potential in terms of climate, soil conditions, and crop production capabilities; indigenous fertilizer raw materials (natural gas, phosphate rock, sulfur, and potash); fertilizer transportation system; future fertilizer manu-

facturing plans; fertilizer use and practice; agricultural extension services; community development programs; soil testing laboratories; present and projected consumption of fertilizer; and fertilizer marketing and distribution. The unifying theme of these topics is their impact on the supply, demand, and price of fertilizer. The following time-phased recommendations for immediate fertilizer cost reductions are made: Phase I: (1) expand imports of bagged fertilizer (mono- and diammonium phosphate and urea) rather than package loose fertilizer at port-of-entry; (2) monitor world fertilizer market conditions to determine the best time to release tenders for fertilizer purchases as opposed to paying spot prices; (3) purchase in volume for lower per-ton price; (4) handle fertilizer imports through cooperatives to keep mark-up low; and (5) use direct inland transport from the port to avoid handling losses and interim storage. Phase II: have cooperatives import loose fertilizer and initiate small-scale bagging operations at a bagging factory in Cochabamba. Phase III: have cooperatives establish fertilizer bulk-blending facilities at the Cochabamba bagging factory to complement the bagging system installed in Phase II (by this time, fertilizer use should have increased to a point allowing cooperatives to import fertilizer in bulk). Phase IV: have cooperatives incorporate indigenously-produced fertilizers into the bulk-blending arrangement. Phase V: choose new fertilizer-blending sites (preferably at nitrogen and phosphate plants) as increased demand for fertilizer outpaces the Cochabamba factory's output. Phase VI: add locally available potash to fertilizer production. A 52-item bibliography (1969–78) is appended.

AID/511-165-T 511000100

Paper copy $11.05 Microfiche $1.08

023 PN-AAJ-093

FERTILIZER MANUAL

International Fertilizer Development Center (IFDC).
1979, 364 p.

IFDC Reference Manual R-1; this manual updates U.N. Fertilizer Manual ST/CID/15 (1967)

To provide developing countries a state-of-the-art reference, the International Fertilizer Development Center prepared this manual on the history, chemistry, technology, and economics of fertilizer production. Part I details fertilizer use since the mid–19th century, reviews growth in the industry from 1950–76, and forecasts increased production and consumption as well as raw material shortages up to the year 2000. Fertilizer's impact on crops, soil, and moisture supply is examined. A glossary and a review of the sources and availability of raw material inputs to fertilizer manufacture are included. Part II describes the properties, production, transportation, storage, and use of nitrogen fertilizers— calcium, ammonium, sodium, and potassium nitrate; nitric acid; ammonium chloride and sulfate; and urea. Phosphate fertilizers are similarly discussed in Part III with emphasis on the production, chemistry, and use of fertilizers derived from phosphoric and sulfuric acids and nitrophosphates. Part IV details the use of potash, compound, and controlled-release fertilizers and secondary/micro-nutrients. Physical and chemical attributes such as particle size, segregation properties, granule hardness, moisture absorption, and caking are also examined. Part V provides a detailed view of fertilizer industry planning and economics. Pollution (e.g., gaseous, liquid, and solid wastes) and other environmental factors are explored. Information is provided on establishing a grassroots fertilizer plant in a developing country and on planning a fertilizer industry. Process plants built using modular, platform, and barge technology are recommended for developing countries, especially in cases where hydrocarbons and other materials are accessible to water transport. Also covered is the economics of world fertilizer manufacture and the key problems facing the industry—inadequate infrastructure, underutilization of existing capacity, rising costs, and especially, the need to produce more fertilizer and provide it to small farmers at the lowest possible price. References are appended to each section, and the text is highlighted with numerous charts, tables, graphs, and diagrams.

AID/ta-C-1318 931005400

Paper copy $47.32 Microfiche $4.32

024 PN-AAJ-132

RECENT DEVELOPMENTS IN RESEARCH ON NITROGEN FERTILIZERS FOR RICE

Craswell, E.T.; De Datta, S.K.
International Rice Research Institute (IRRI); International Fertilizer Development Center (IFDC).
1980, 10 p.

In IRRI Research Paper Series, No. 49

Asian governments and farmers, pressured by growing populations, have sought to increase rice production by using high-yield rice varieties and nitrogen fertilizers. Rice uses nitrogen fertilizers inefficiently, however, especially urea, which accounts for 85% of nitrogen fertilizers produced in Asia. This paper examines studies conducted in 11 Asian countries by the IRRI and the IFDC to determine the causes of nitrogen losses and ways to reduce them. Since these losses cannot be measured directly, a method was devised for measuring them indirectly by measuring losses in the balance of an introduced stable isotope, 15N (15N balance technique). The main nitrogen loss mechanisms were identified as ammonia volatilization and, to a lesser extent, nitrification-denitrification. The potential for ammonia volatilization was measured by studying the urea and ammonium-nitrogen concentrations in the floodwater after fertilizer application. It was found that reducing these concentrations is likely to reduce losses due both to volatilization and to surface runoff. Recent IRRI measurements of nitrous oxide fluxes from wetland soils give evidence that nitrification-denitrification does occur and appears peculiar to flooded soils. IRRI also studied the effect of deep placement of urea supergranules (USG) on root and algal growth patterns. Deep placement

provided a bonus of nitrogen to the soil-plant system while not disturbing the natural algal flora as broadcast nitrogen fertilizers do. Research to increase nitrogen fertilizer efficiency shows that both deep placement of USG and conventional placement of slow-release fertilizers such as sulfur-coated urea (SCU) increase rice yields compared with split-application techniques. Data from 117 trials in Asia show a US$4–7 return for every extra dollar spent on labor for deep USG application or the cost of SCU. Individual test results, however, vary from site to site and season to season, suggesting the need for further research before a specific fertilizer or management practice is adopted, particularly since the trials were conducted at irrigated sites with good water control—markedly different from the majority of Asian rice fields. A 17-item bibliography (1954–80) is appended.

AID/492-1310-T 497019800

Paper copy $1.30 Microfiche $1.08

025 PN-AAJ-559

U.S. FERTILIZER TECHNOLOGY PATENTS

Mackey, J.J.
Tennessee Valley Authority (TVA), National Fertilizer Development Center (NFDC).
1979, 160 p.

Fertilizer patents issued in the United States provide much of the technology used in the fertilizer industry worldwide. This report contains 1,014 abstracts of selected U.S. patents previously published in the NFDC's monthly journal, *Fertilizer Abstracts*, between 1968 and 1978. The abstracts, representing those U.S. patents and U.S. equivalents of previously issued foreign patents deemed most pertinent to today's fertilizer industry, are divided into nine major sections. The first section, on nitrogen fertilizer processes, is rather substantive—due to the growing interest in coal gasification and nitrogen liquids—and discusses nitrogen fixation hydrogen, ammonia, nitric acid, ammonium nitrate and sulfate, urea, and controlled and other nitrogen fertilizers. The section on phosphorus fertilizer processes is the largest, due to the vast amount of research done on wet process acid in recent years, and covers such topics as the mining, handling, and processing of phosphate rock; phosphorus production; phosphoric acid manufacture, concentration, and purification; phosphate products; and the recovery and utilization of phosphorus byproducts. Regarding the potassium fertilizer industry, potassium recovery, handling, and processing and potassium compounds are covered. Other, smaller sections discuss sulfur and sulfuric acid in the fertilizer industry; mixed fertilizer-solids (i.e., N-P, N-K, P-K, and N-P-K fertilizers); mixed fertilizer-fluids (i.e., N, N-P, P-K, and N-P-K fertilizers); solid and fluid secondary and micronutrient fertilizers; controlled release fertilizers; and granulation, conditioning, equipment, and environmental control as related to multinutrient products. In addition to the abstract, the person and/or corporation holding the patent, the patent number, the date of the patent, and the pagination of the patent document are included for each entry; an index of company names is appended. Complete copies of all the U.S. patents cited can be obtained for a nominal fee from the U.S. Patent and Trademark Office in Washington, D.C.

RS/TV-01-74 931083200

Paper copy $20.80 Microfiche $2.16

026 PN-AAJ-560

SWAZILAND WATER AND RELATED LAND RESOURCES FRAMEWORK PLAN

U.S. Army Corps of Engineers.
1981, 436 p.

Large-scale irrigation and related industrial development can significantly contribute to the Government of Swaziland's (GOS) goals in the problem areas of employment, government revenue, foreign exchange, imports, and environmental degradation. This report is designed to provide a conceptual framework for future water resources development in Swaziland and to enable the GOS to effectively negotiate with its neighbors, particularly the Republic of South Africa (RSA), regarding development of international rivers. The report consists of: (1) an analysis of the impact of planned RSA water resources development on the supply and demand for water from the Komati, Lomati, Mbuluzi, Great Usutu, Ngwavuma, Ngwempisi, and Mkondo Rivers; (2) detailed preliminary plans and analyses of proposed water resources development projects on the Lomati and Komati rivers and in the Mbuluzi, Ngwavuma, and Usutu basins; and (3) a series of 21 baseline studies on population, soil conservation, water quality, recreation, tourism, fisheries, energy, ground water, land use, hydrology, hydropower, irrigation, water consumption, damsite screening, and the economy in Swaziland. The report points out that irrigation is the largest consumer of water and the key to the economic feasibility of water resources development; current and proposed RSA irrigation developments could significantly affect Swazi water development; and neither hydropower nor other multipurpose uses of water development will add to the viability of Swazi water resources development. The report also highlights the need for: (1) detailed analyses of flow records, crop yields, and water resource development's impact on agricultural supplies and prices; (2) reservoir surveys, site investigations, and sediment, soil, and spillway design studies; (3) mathematical models capable of evaluating complex water systems; and (4) careful research and planning regarding attainment of long-term socioeconomic and environmental goals with only minimal short-term disruption. Also included are 13 maps on transport and land tenure in Swaziland and the physiography and hydrology of the nation, and a 71-item bibliography (1965–80).

DS/SWAZ-0135-1-79 698013500

Paper copy $56.68 Microfiche $5.40

027 **PN-AAJ-359**

IMPROVING IRRIGATION WATER MANAGEMENT ON FARMS: FINAL REPORT

Skogerboe, G.V.; Reuss, J.O.; Kemper, W.D.
Colorado State University, Engineering Research Center.
1980, 75 p.

Water Management Technical Report No. 66

Inadequate onfarm water management (OFWM) is often the main constraint to agricultural production in the developing world. This final report describes the results of an AID-funded, 1968–80 research project in Pakistan by Colorado State University (CSU) to develop guidelines to improve OFWM. A 1979 USAID review estimated that the project's institutional and technological achievements could increase irrigated land production by nearly 90 million ha in developing countries worldwide. Project successes included improving crop stands and yields through bed and furrow planting, hand weeding, crust control (through mechanical means or by timing irrigation water), field drainage, and land leveling; introducing the Cutthroat flume to measure watercourse losses; developing irrigation controls; testing skimming wells to reduce salinity; use of basin and furrow irrigation; identifying poor land levelling as a major cause of overirrigation; and conducting consumptive use studies on wheat, berseem, and cotton. Poor watercourse maintenance, poor local organization, and inadequate farmer knowledge of the extent of watercourse losses and of water management techniques were identified as key socioeconomic constraints to production. In addition, extension officers from the University of Agriculture, Faisalabad (UAF), were trained to help farmers manage expanded water supplies, leveled land, inputs, and weed and pest activities. Further research needs in Pakistan are to develop technologies to decrease salinity and waterlogging; strengthen the OFWM capabilities of user organizations and the Ministry of Agriculture's Irrigation Department; and provide field research and training at UAF, other research institutes, and in Baluchistan Province. The project taught the advantages of not placing CSU in a counterpart role and of using an interdisciplinary approach; the need to conduct research with active farmer involvement and with a view to increasing production; and the need to address field problems (both for research and to provide a training ground for host country personnel) and to disseminate research results. Appendices include a brief project history and a list of research publications.

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028 **PN-AAJ-212**

LIVESTOCK AND MEAT MARKETING IN WEST AFRICA; VOLUME I: SYNTHESIS, UPPER VOLTA

Arizo-Nino, E.J.; Herman, L.; Makinen, M.; Steedman, C.
Michigan University, Center for Research and Economic Development.
1980, 210 p.

Volumes I-V: PN-AAJ-212 through PN-AAJ-216

The prolonged Sahelian drought (1968–74) and the restructuring of international meat trade have made Sahelian meat producers wonder whether they will continue to dominate coastal West African markets. This report is the first of a five-part study of this market phenomenon. The report is in two parts. Part one synthesizes the findings of the study as a whole, e.g., characteristics of the coastal market and potential markets for Sahelian exports; addresses key issues, e.g., the structure of the livestock trade and the expanding world meat economy; and makes policy recommendations for the Sahelian and coastal countries. General conclusions are that increasing Sahelian livestock production is warranted—fears of a declining meat demand in coastal West Africa are unfounded; that changes in market policy should work within the current system, not replace it; and that promoting livestock trade between the Sahel and coastal countries is in the interest of both sides. Ways to implement these policies are suggested. The report's second part is a livestock sector study of Upper Volta in terms of livestock production and marketing, the government's stratification policy, herd growth and offtake into 1985, meat marketing, domestic consumption, cattle and red meat exports and their costs, and livestock export projections into 1985. The study concludes that increased production of beef and edible offals will be outstripped by domestic demand, leading to a decline in exports of both products. Small ruminant production, however, will exceed demand, resulting in increased export potential, although small ruminant production will ultimately decline due to decreasing prices and increasing domestic consumption. The relative scarcity of cattle will have the opposite effect, with lower market prices for edible offals making beef less price-competitive. Ivory Coast will remain Upper Volta's chief market, but currency convertibility problems and Ghanan price policies will keep Volta's small trade with Ghana in decline. Togo and Benin will remain small but steady markets. Trade with Niger is unlikely to expand, but market potential does exist, especially for small ruminants, in North Africa and the Middle East. A 27-item English and French bibliography (1969–80) is appended.

REDSO/WA-77-105

Paper copy $27.30 Microfiche $3.24

029 **PN-AAJ-213**

LIVESTOCK AND MEAT MARKETING IN WEST AFRICA; VOLUME II: BENIN, GHANA, LIBERIA, TOGO

Josserand, H.; Sullivan, G.
Michigan University, Center for Research on Economic Development.
1979, 150 p.

Volumes I-V: PN-AAJ-212 through PN-AAJ-216

Drought in the Sahel, traditionally the main meat supplier of coastal West Africa, and a changing world meat economy, have thrown the future of West African livestock and meat

exports into doubt. This report, the second of a five-part study, profiles current and projected livestock and meat marketing patterns in the West African countries of Benin, Ghana, Liberia, and Togo. Each study examines domestic production and marketing systems (including transportation) and supply, demand, and import requirements. In 1966, Sahelian states, Niger in particular, supplied 83% of Benin's frozen and chilled meat imports; since 1970, they have supplied none at all. In addition, the prolonged drought severely affected Benin's imports of livestock from the Sahel between 1966 and 1976. Current restrictions on meat exports to Nigeria because of high Nigerian cattle prices have constrained Benin's domestic production and, unless rescinded, will constrain domestic production and hence domestic demand. Private livestock marketing is more efficient than its public equivalent, which should be restricted to production. In Ghana, domestic livestock production, hampered by several factors, including lack of a national policy and central organization, will be able to supply just a little over two-thirds of domestic demand for red meat by 1985. Resumed livestock trade with the Sahel may help alleviate this shortfall, although trade will probably involve different livestock and require government clearance. In the short term, poultry and fish will be likely protein substitutes. Liberian domestic production satisfied 60% of domestic meat consumption in 1977. Imports, mainly of frozen meat, were chiefly from western markets, with limited livestock imports from other West African states (Mali, Ivory Coast, Sierra Leone, and Guinea). It is not expected that the Sahel will displace either of these Liberian markets. The Sahel has been displaced as a supplier of Togo's growing meat import needs by other suppliers, especially Upper Volta and the United States, and can only recover its market position by becoming more price-competitive with those countries. Bibliographic entries totalling 57 French and English items (1968–77) are included.

REDSO/WA-77-105

Paper copy $19.50 Microfiche $2.16

030 **PN-AAJ-214**

LIVESTOCK AND MEAT MARKETING IN WEST AFRICA; VOLUME III: IVORY COAST AND MALI

Delgado, C.; Staatz, J.
Michigan University, Center for Research on Economic Development.
1980, 455 p.

Volumes I-V: PN-AAJ-212 through PN-AAJ-216

Mali is the Sahel's principal meat and livestock supplier to coastal West Africa; the Ivory Coast is the latter region's main consumer of Sahelian meat products. This report, the third of a five-part study on West African livestock and meat marketing, provides sector reports for both countries. The Malian report discusses the potential for augmenting domestic production and the absorption capacity of Mali's export markets by examining livestock production systems and government sector policy; herd numbers and range production parameters (1967–77); production of feed animals (1967–77); cattle production constraints; offtake and herd growth for 1985; domestic consumption and retail prices of red meat (1977); exports of livestock and red meat (1967–77) and projected exports for 1985; export and production costs of livestock and red meat (1977–78); and policy conclusions. The report concludes that the simultaneity of a glut of Latin American beef and an absence of Sahelian exports in 1975 was an aberration. The market for Malian exports remains strong, particularly in the Ivory Coast, and only low domestic productivity will constrain its exports. Small ruminants, especially sheep and goats, offer excellent export potential. Donor assistance for cattle feedlot operations to promote exports, however, is not warranted. The Ivory Coast report examines the nation's increasing demand for animal protein; its beef supply (1967–78); pricing and marketing structure for cattle, beef, and small ruminants; poultry, pork, and fish supplies; livestock policy and future domestic production; and demand and supply projections for 1985. Domestic demand for animal protein will grow, increasing imports of beef and small ruminants 3.1%–5% by 1985. The source of these imports will depend on European Economic Community meat policies and on the extent to which Ivory Coast has to compete with new markets for Sahelian meat. Improving the current Mali/Ivory Coast marketing system, e.g., by constructing new cattle trails, could increase the system's productivity and decrease costs. Since domestic demand for 1985 will require average quality meat, more high quality animal feedlots in the Sahel are unwarranted. Bibliographies totalling 62 French and English titles (1967–80) are included.

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Paper copy $59.15 Microfiche $5.40

031 **PN-AAJ-215**

LIVESTOCK AND MEAT MARKETING IN WEST AFRICA; VOLUME IV: ARGENTINA, AUSTRALIA, NEW ZEALAND

Arizo-Nino, E.J.; Griffith, J.L.P.
Michigan University, Center for Research on Economic Development.
1979, 244 p.

Volumes I-V: PN-AAJ-212 through PN-AAJ-216

As part of a five-volume study of livestock and meat marketing in West Africa (WA), this report, the fourth in the series, examines meat exports to WA by three non-African countries—Argentina, New Zealand, and Australia. The Argentine study examines the nation's domestic livestock production and market systems and its meat trade with Africa. Since 1974, Argentina's beef exports to Africa, which account for 98% of all its meat exports to the continent, have increased 25% due to WA's increase in foreign exchange, poor cattle raising conditions, unavailability of port facilities, rapid urbanization, and rising per capita income. Although this upsurge in beef imports includes WA, four non-WA countries—Nigeria, Tunisia, Egypt, Angola—import more than 60% of total beef exports to Africa. Due to a

lack of direct commercial links (which Argentina is now trying to establish) and mutual distrust between Argentina and Africa, beef transport is conducted through European trading houses. Future Argentine trade with Africa may be affected by the demise of the Argentine Meat Producers' Association, a key figure in promoting Argentine-African trade. The Australian and New Zealand studies outline the respective nation's meat industry (1967–78) and exports and the impact of Middle Eastern and African markets on country production into 1985. In 1977, Australia and New Zealand exported, respectively, 26% and 9.7% of the world's beef and 33.4% and 47% of the world's mutton and lamb. The main lamb and mutton markets of both countries are, respectively, the United Kingdom and Japan. Other key markets are, for Australia, the Middle East (live sheep and lamb since 1975) and the United States (beef); and, for New Zealand, the United States (beef). Through 1985, lamb, mutton, and beef production will increase in both Australia and New Zealand, with beef production in Australia reaching record levels. The traditional meat export markets for both countries will remain basically the same. WA neither has been nor is expected to be a significant meat importer from either country and its markets will only be affected indirectly by Australian and New Zealander exports to the Middle East and Libya. Appended is a 60-item bibliography (1969–78) of Spanish and English sources.

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Paper copy $31.72 Microfiche $3.24

032 **PN-AAJ-216**

LIVESTOCK AND MEAT MARKETING IN WEST AFRICA; VOLUME V: THE WORLD ECONOMY, OTHER SUPPLIER AND CONSUMER COUNTRIES

Arizo-Nino, E.J.; Manly, D.W.; Shapiro, K.H.
Michigan University, Center for Research on Economic Development.
1980, 188 p.

Volumes I-V: PN-AAJ-212 through PN-AAJ-216

A 1976 rise in West African (WA) meat imports from non-African producers has caused Sahelian producers to fear a loss of their WA customers. This four-part study, the last of a five-part report on WA livestock and meat marketing, finds a basis for this fear in world meat market changes. The study's first part describes the world beef economy as cyclically changing from high to low production as a result of meat producers' tendency to exaggerate price changes, protectionist economic policies, and the relatively small impact of imports on home country consumption. An overview of this economy from 1960 to 1978 shows that after 1972 all four major meat producing areas—Argentina, Australia, the European Common Market (EEC), and the United States—increased production, leading to massive oversupply and an increasingly competitive world market. This situation is likely to return in the medium and long term, with clear implications for Sahelian producers. The study's second and third sections describe WA meat imports from Uruguay and from Denmark and France. The Uruguayan report examines the country's meat production and marketing sectors and exporting trends. In 1978, trade with Africa, particularly in frozen beef, accounted for 15% of Uruguay's meat exports, with Egypt (75%), Ghana (26%), Nigeria, Zaire, Morocco, and the Ivory Coast being the main markets. Nigeria in particular offers potential for expanded trade. The Denmark/France report examines meat trade with WA and the impact of future domestic and EEC policies. To date, meat trade with WA has been small, possibly excepting French trade with the Ivory Coast, and will remain so, although intra-EEC beef trading is likely to increase with projected increases in EEC membership. The study's final section examines potential markets for Sahelian producers—Algeria, Egypt, Libya, Kuwait, Saudi Arabia, and the United Arab Emirates (UAE). The greatest potential lies in trade with Algeria and Libya and to some degree with Egypt. To cut freight costs, the full use of return loads should be explored. A major promotional center for Sahelian products in the Middle East, centering on the UAE, is also advised. A total of 40 Spanish and English sources (1960–80), are appended.

REDSO/WA-77-105

Paper copy $24.44 Microfiche $2.16

033 **PN-AAJ-077**

DEVELOPMENTS IN THE CONTROL OF BACTERIAL DISEASES OF POTATOES; REPORT OF THE PLANNING CONFERENCE, LIMA, PERU, 1979

International Potato Center (CIP).
1980, 141 p.

Despite significant progress in breeding disease-resistant potato varieties, the study and control of potato bacterial diseases remains a high priority for the CIP. This report highlights the CIP's Eighteenth Planning Conference, held in Lima, Peru from June 12–15, 1979. The Conference sought to integrate CIP's work with that of other institutions and acquaint the scientific community with CIP's resources and expertise. The 14 papers presented at the Conference, outlining the current status of potato bacterial disease research and control, emphasized that *Pseudomonas solanacearum* (bacterial wilt) is the most serious potato disease in developing and lowland tropical countries. Its presence in lowland soils, aggravated by wilt's affinity to a variety of lowland vegetation and crops other than potatoes, has necessitated planting potatoes at high elevations in tropical and semitropical areas. The classification, distribution, and origin of the pathogen are examined, and methods for field and laboratory diagnosis and sources of resistance to *P. solanacearum* are identified. Significant attention was also devoted to two soft-rotting genera of bacteria, *Erwinia* and *Clostridium*. These bacteria, which rot both stem and tubers, are examined in terms of epidemiology, sources of contamination, the effect of the environment, and methods for their control. *Corynebacterium sepedonicum*, the causal organism in bacterial ring-rot disease, is analyzed regarding potato production and storage losses in Costa Rica, Colombia, and Peru. It is recommended

that future research: (1) identify additional genes for disease resistance; (2) use resistant genes now available in clones; (3) quantitatively evaluate selected clone's resistance to different strains; (4) improve screening methods and strain selection and identification procedures; (5) establish adequate testing sites; (6) provide resistant clean seed to cooperating countries; (7) design integrated control programs for small farmer use; and (8) identify further research needs on the nature of disease resistance. The Conference's participants and agenda are appended. Bibliographies are included with each paper.

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Paper copy $18.33 Microfiche $2.16

034 **PN-AAJ-081**

A METHODOLOGY FOR DETERMINING INSECT CONTROL RECOMMENDATIONS

Litsinger, J.A.; Lumaban, M.D.; Bandong, J.P.; Pantua, P.C.; Barrion, A.T.; Apostol, R.F.; and Ruhendi.
International Rice Research Institute (IRRI).
1980, 31 p.

In IRRI Research Paper Series, No. 46

A cropping systems approach has recently emerged as an effective means of improving insect control—a task which, because of its complexity, high demand on resources, and location-specific nature, has impeded past efforts to produce onfarm yields comparable to those obtained at research stations. This report explains the role of cropping systems research in insect pest control and outlines a methodology for determining insect control recommendations. Cropping systems research entails specifying a given insect pest control technology by taking into account cropping patterns of individual farmers, the geographical and temporal distribution of pests, environmental parameters (e.g., rainfall, soil type, landform), cultural practices (e.g., planting, irrigation, and insecticide application methods), farmers' capabilities (e.g., his resources, beliefs, and customs), and the crop's inherent yield potential. A four-part methodology for using cropping systems data, developed in accordance with the requirements of the Asian Cropping Systems Network of research sites, is presented. The initial stage, description, entails gathering baseline economic and biological data on pests known to farmers, the level of pest control needed, the current status of insect control, and the kinds and levels of technology farmers are willing to adopt. Next, several tentative insect control technology packages compatible with farmers' resources and capabilities are designed. These packages consist of specific insect pest control recommendations—i.e., lists of insects and the insecticides effective against them, resistant varieties, and cultural control methods—pertaining to the entire spectrum of pest problems for each crop within the target area. These alternative packages are then tested for several years at each site. Finally, the costs and returns of the alternative packages are evaluated. The above method, in the authors' opinion, will allow the development of optimal insect control recommendations within 2–3 years, is highly objective, is not costly, and can be carried out by researchers with minimal experience. A 21-item bibliography (1976–79) is appended.

AID/DSAN-G-0083 931082611

Paper copy $4.03 Microfiche $1.08

035 **PN-AAJ-085**

THE CONTRIBUTION OF VARIETAL TOLERANCE FOR PROBLEM SOILS TO YIELD STABILITY IN RICE

Mahadevappa, M.; Ikehashi, H.; Ponnamperuma, F.N.
International Rice Research Institute (IRRI).
1979, 15 p.

In IRRI Research Paper Series, No. 43

The erratic performance of modern rice varieties in many countries has been attributed to physical and biological environmental stresses to which the plants are not adapted. This paper compares the field performance of different rice varieties in soils with common mineral stresses—phosphorus deficiency, zinc deficiency, or iron toxicity in wetland rice fields and iron deficiency in dryland rice fields. Genotypes of comparable high yield potential but different tolerance to mineral stresses were selected on the basis of greenhouse tests and tested for field performance (growth, yield, and mineral absorption) in mineral-stressed soils during the 1978 dry and wet seasons and the 1979 dry season in the Philippines. Where possible, tests were conducted at three stress levels—no stress, mild stress, and severe stress. Results showed that tolerance varied widely with genotype and stress level. Sensitive rices suffered severe yield losses even under mild stress, whereas tolerant rices resisted the yield decline until the stress became moderate; under severe stress, both tolerant and sensitive genotypes perished. The contribution of varietal tolerance to yield ranged from 0.5 to 0.8 tons/ha for phosphorus deficiency, 0.5 to 1.5 tons/ha for zinc deficiency, and 0.2 to 0.7 tons/ha for iron deficiency at yield levels of 2.5 to 4.0 tons/ha. Results also showed a higher uptake of the deficient element by tolerant rices than by sensitive ones. Ratings in mass screening at the seedling stage correlated closely with yield in the zinc and iron deficiencies tests. However, correlation was poor in phosphorus deficiency and iron toxicity tests due to later recovery from the stress, especially by late-maturing rices, indicating the need for yield tests in the field. The authors note that, ideally, varietal tolerance should complement, not replace, soil amendments (such as the addition of fertilizers), but that in some situations soil amendments may be too costly or impractical. A system of initial mass screening of seedlings followed by field tests of promising varieties is recommended to select stress-tolerant rices. A 21-item list of references (1963–79) is appended.

AID/DSAN-G-0083 931082611

Paper copy $1.95 Microfiche $1.08

036 **PN-AAJ-130**

DIFFERENTIAL RESPONSE OF RICE VARIETIES TO THE BROWN PLANTHOPPER IN INTERNATIONAL SCREENING TESTS

Seshu, D.V.; Kauffman, H.E.
International Rice Research Institute (IRRI).
1980, 13 p.

In IRRI Research Paper Series, No. 52

The brown planthopper (BPH), *Nilaparvata lugens*, has become a serious threat to rice production in several South, Southeast, and East Asian countries. This paper discusses results of International Rice Brown Planthopper Nursery (IRBPN) screening tests conducted 1975–79 with special reference to understanding biotype variations in BPH and identifying sources of genetic resistance to these biotypes. The number of rice varieties tested ranged from 41 in 1975 to 162 in 1979 and included several traditional tall varieties and improved semidwarf breeding lines; varieties containing the BPH-resistant genes Bph 1, bph 2, Bph 3, and bph 4 were included. A uniformly high susceptibility to BPH at different sites indicated a major distinction between BPH populations in South Asia (Bangladesh, India, and Sri Lanka) and those in the rest of Asia. Biotype differences of lower order within BPH populations common in East and Southeast Asian countries were also evident. Biotype differences were also evident at different sites in India, since reactions at Pantnagar were different from those at other sites. It was found that varieties which showed similar resistance patterns at the IRRI in the Philippines did not necessarily show similar patterns at other sites. PTB33, Suduru Samba, and Sinna Sivappu were found to be resistant at almost all test sites. Several improved breeding lines derived from PTB33 showed promise in all the regions of Asia and the Solomon Islands. Genes conveying BPH resistance in PTB33 seem to be different in South Asia from those in other parts of Asia, as evident from the different reactions of the semidwarf selections derived from that variety. Differences between field and greenhouse reactions for several varieties were observed, but more detailed studies are needed to provide genetic interpretation for these differences. Further international collaboration is recommended for follow-up breeding and genetic studies to develop varieties with genetic resistance to BPH in different countries. The report concludes with suggestions for breeding such varieties. A description of IRBPN's screening and scoring procedures and a 7-item list of references (1971–79) are appended.

AID/492-1310-T 497019800

Paper copy $1.69 Microfiche $1.08

037 **PN-AAH-741**

SEED HANDLING AND PRODUCTION FOR THE ACRE PROJECT (SIERRA LEONE)

Potts, H.C.
Mississippi State University, Seed Technology Laboratory.
1980, 33 p.

Agriculture in Sierra Leone is dominated by the production of the national staple—rice. To help increase production of other crops, A.I.D. has sponsored the Adaptive Crop Research and Extension (ACRE) project, a 5-year effort to perform adaptive food crop research and develop a replicable technology delivery system responsive to the needs of rural smallholders, particularly in upland areas. This report outlines Mississippi State University's contribution to the seed handling and production component of this project. After first providing a general overview of agriculture in Sierra Leone and the role of the ACRE project, the author discusses the need for an upgraded seed storage room and additional seed handling equipment at the 100-acre project site adjacent to Njala University College. A vapor-proof, insulated, air-conditioned storage area is needed to safely store a small volume of seeds from each of a large number of varieties for up to 30 months. However, since seed testing programs can only be justified when large numbers of farmers are able to use the improved seeds, coordination with the West German-supported Seed Multiplication Project (SMP) is essential. Thus the National Seed Board has directed that ACRE be primarily responsible for providing advice on seed and propagating materials and for maintaining a National Variety List, while the SMP is responsible for multiplying and marketing seeds from successful varieties. Although many factors affect stand establishment, which is the goal of this project, only seed quality and seed bed preparation are under the direct influence of most farmers. It is therefore recommended that future ACRE seed research concentrate on practical means of obtaining better stands. Three specific areas of research are suggested: (1) gathering information on the influence of different levels of seed quality on stand establishment given different rates of planting; (2) investigating the influence of seed treatment (fungicides and insecticides) on stand establishment for various seeds; and (3) evaluating and developing improved onfarm storage facilities. An equipment list and variety description forms are appended.

AID/DSAN-CA-0148 636019200

Paper copy $4.29 Microfiche $1.08

038 **PN-AAJ-071**

BEAN PROGRAM; ANNUAL REPORT, 1979

Centro Internacional de Agricultura Tropical (CIAT).
1980, 112 p.

In CIAT Series, No. 02EB1-79

During 1979, CIAT's bean research program concentrated on germplasm improvement, that is, developing resistance to diseases and insects, especially to common mosaic virus (BCMV), rust, common bacterial blight, angular leaf spot, anthracnose, and leafhoppers. This report details that work, which also included an agroclimatology study, hybridization and progeny evaluation, evaluation and improvement of agronomic practices, validation of technology in on-farm trials, and other studies relating to temperature adaptation, growth habit stability, and seedling vigor. A total of 10,000 germplasm

accessions were inoculated and evaluated under screenhouse and field conditions at CIAT and in Popayan. A modification in the screening methodology—inoculating and evaluating (progeny test) individual F_1 or advanced selections under greenhouse conditions rather than field inoculation of F_2 families—considerably increased screening efficiency. Tests were made for resistance/tolerance to viral diseases, fungal and bacterial diseases, insects, moderately acid soils, and water stress. All improved lines are now resistant to BCMV. Lines resistant to multiple diseases and pests have been entered in the international yield trials. Significant differences in disease and insect pest incidence were confirmed in maize-bean associations as compared to monocultures. Farm trials were carried out in Huila, Colombia with monoculture bush beans, in the Restrepo region with monoculture bush beans, and in Antioquia with climbing beans in relay systems with maize. Materials in the 1979 IBYAN (International Bean Yield and Adaptation Nursery) were still deficient in meeting consumer acceptability, but have high agronomic value. Attention was also directed to developing tolerance to production constraints such as drought, low phosphorus availability in the soil, and biological N_2 fixation. Improved biological N_2 fixation under higher temperatures was achieved. In addition, efforts were made to strengthen the research and technology transfer network in Latin America by selecting trainees from the region, organizing meetings and workshops, distributing germplasm, and collaborating with country programs.

AID/ta-G-1090

Paper copy $14.56 Microfiche $2.16

039 **PN-AAJ-072**

THE LEGUME/"RHIZOBIUM" SYMBIOSIS IN TROPICAL AGRICULTURE: A BIBLIOGRAPHIC UPDATE

Bose, J.
University of Hawaii, Department of Agronomy and Soil Science.
1980, 169 p.

As part of its AID-supported NifTAL project, the University of Hawaii published in 1978 an annotated bibliography on the legume-*Rhizobium* symbiosis in tropical agriculture. This volume updates that bibliography, with some changes in subject designations to reflect new areas of emphasis in research. A total of 699 entries are arranged according to subject under the following headings: bibliographies, general reviews and research surveys; carbon and carbon compound competition (microbial); energetics; enzymes (other than hydrogenase or nitrogenase alone); genetic factors; hormones and growth substances; hydrogen and hydrogenase; inoculant production and distribution; inoculation methods and materials; inoculation requirements and effects; leghemoglobin; legume agronomy and evaluation; legume physiology and taxonomy; light factors; macronutrients (other than nitrogen alone); methods, techniques, and statistical procedures; micronutrients and toxic elements; microorganisms (other than *Rhizobium* alone); nitrogen cycle; nitrogen effects; nitrogen fixation; nitrogen fixation—detection and measurement; nitrogenase; nodulation; nodules; oxygen; pests and pesticides; pH; phages and plant viruses; photosynthesis and photosynthates; polycrop systems; *Rhizobium* bacteroids; *Rhizobium* characteristics and physiology; *Rhizobium* collecting and collections; *Rhizobium* counts and populations; *Rhizobium* cultures and culture media; *Rhizobium* detection and identification; *Rhizobium* effectiveness, infectiveness, and efficiency; *Rhizobium* inhibition and stimulation; roots, root exudates, and infection by *Rhizobium*; soil factors; specificity and promiscuity; survival of *Rhizobium*; symbiosis; temperature effects; and water factors. Bibliographic listings originated from several sources, including computer search of magnetic tapes from the National Agricultural Library to October 1978; *Current Contents* listings; the Automated Science Citation Alert service; staff requests; reference lists accompanying published papers; and receipt of reprint copies from authors. Most articles cited are in English or have English summaries or abstracts. A cross-reference guide is included, as are subject and author indices.

AID/DSAN-G-0100 931012900

Paper copy $21.97 Microfiche $2.16

040 **PN-AAJ-079**

IR42: A RICE TYPE FOR SMALL FARMERS OF SOUTH AND SOUTHEAST ASIA

Ponnamperuma, F.N.
International Rice Research Institute (IRRI).
1979, 10 p.

In IRRI Research Paper Series, No. 44

Barely a decade after new "miracle rices" developed during the Green Revolution prompted predictions of food self-sufficiency, developing countries are being warned that rice production is not keeping pace with population growth. This grim forecast stems from the fact that in vast areas of South and Southeast Asia, farmers have not accepted these new rice varieties. Even when improved varieties are grown, yields are about one-third of experimental yields because small farmers lack the resources to provide the water control, soil amendments, fertilizers, and pesticides necessary for high yields. This report summarizes findings on a new rice variety, IR42, which was bred to produce stable yields in unfavorable environments. IR42, one of 21 varieties tested in 1977 by the IRRI at 21 sites in eight South and Southeast Asian countries, gave the highest yield at three sites, yields that did not differ significantly from the highest in three others, and outyielded IR8 in seven countries. Tests in 1978 of 28 rice varieties at 13 Southeast Asian sites produced comparable results. IR42, a medium-grained, high-amylose rice with relatively good appearance and moderate drought and submergence tolerance, is better suited to rainfed areas than earlier improved varieties. It demonstrates good resistance to a wide range of diseases and insects including blast, rice tungro virus, rice grassy stunt, and bacterial leaf blight, but is susceptible to *Bakanae*. IR42's ability to do well in soils deficient in nutrients such as nitrogen, phosphorus, and

zinc, makes it well suited to Southeast Asian farmers who lack access to large amounts of fertilizers. IR42 also produces moderate yields under adverse soil conditions such as salinity, alkalinity, iron and boron toxicity, and excessive organic matter, enabling farmers to expand cultivation of problem lands. A 35-item bibliography (1956–79) is appended.

AID/DSAN-G-0083 931082611

Paper copy $1.30 Microfiche $1.08

041 **PN-AAJ-084**

IMPLICATIONS OF THE INTERNATIONAL RICE BLAST NURSERY DATA TO THE GENETICS OF RESISTANCE: AN APPROACH TO A COMPLICATED HOST-PARASITE RELATIONSHIP

Ikehashi, K.
International Rice Research Institute (IRRI).
1979, 19 p.

In IRRI Research Paper Series, No. 40

Breeding rice varieties with resistance to blast is made difficult by the wide variability of the causal organism, *Pyricularia oryzae*, and by the lack of a system to describe types of host resistance and fungal races. As a first step in developing functional differential varieties, this paper analyzes entries in the International Rice Blast Nursery (IRBN) in order to compile data on the prevailing types of host resistance. The author theorizes that rice varieties can be considered to have a common genotype only when they react uniformly to diverse races of the causal organism at different sites and in different years. To test this theory, 397 IRBN entries tested in the Philippines in 1976–77 were sorted by reaction type. As a result, 261 entries were classified into 10 major types of host resistance. Subtypes, based on reactions outside the Philippines, were composed for each major group. The more or less uniform reaction of tests in the Philippines and other locations suggested that each group was of similar genotype and that the differentials in the IRBN collection were irrelevant. The author recommends that more functional differentials be developed by identifying the types of resistance actually working in breeding programs as opposed to the previous method of selecting differentials by testing a large number of races against a small group of varieties. This would permit easier identification of resistance types of new IRBN entries since those clearly showing identical reactions to known resistance types would not be further tested while entries with different or ambiguous reactions would be retested. The author emphasizes the need for a minimum differential system to collect and maintain distinct races and thus facilitate the genetic analysis of blast resistance. It is also recommended that the next step in genetic work be hybridizaton among and within resistance types along with simultaneous testing of the progeny to determine the genes that differentiate types of resistance. A 12-item bibliography (1965–78) is appended.

AID/DSAN-G-0083 931082611

Paper copy $2.47 Microfiche $1.08

042 **PN-AAJ-129**

QUALITY CHARACTERISTICS OF MILLED RICE GROWN IN DIFFERENT COUNTRIES

Juliano, B.O.; Pascual, C.G.
International Rice Research Institute (IRRI).
1980, 25 p.

In IRRI Research Paper Series, No. 48

Next to yield, grain quality is the major objective of rice breeding programs. This report describes the quality characteristics of milled rice as assessed by IRRI's Chemistry Department since 1962. Rice samples were obtained from government rice breeding programs in 41 countries and analyzed for protein content, amylose content, alkali spreading value (gelatinization temperature index), gel consistency, amylograph viscosity (changes in paste viscosity of cooked rice flour), and cooked rice Instron hardness and stickiness. Statistical analysis yielded linear correlation coefficients that indicate amylose content is the major determinent of the texture of cooked rice. It correlates negatively with gel consistency and cooked rice stickiness and positively with amylograph viscosity values and cooked rice hardness. Gel consistency correlates negatively with amylograph setback and consistency values and cooked rice hardness; positively with cooked rice stickiness. Amylograph setback and consistency values correlate positively with cooked rice hardness and with each other and negatively with cooked rice stickiness. Hardness and stickiness of cooked rice are negatively related. Alkali spreading and protein content show a lower correlation with the texture of cooked rice than do amylose content or gel and Amylograph consistencies. Protein content is not significantly correlated with amylose content, Amylograph consistency, or cooked rice stickiness, but correlates negatively with gel consistency and alkali spreading value. Increased protein content suppresses amylograph peak viscosity during cooking and increases hardness by effecting cooking rate. Sensory evaluation of cooked samples of important rice varieties in each country is recommended to determine the preferred combination of quality characteristics. A 31-item bibliography (1958–79), data on rice quality characteristics, and rice samples identified by country of origin, variety, and crop year are appended.

AID/492-1310-T 497019800

Paper copy $3.25 Microfiche $1.08

043 **PN-AAJ-868**

FUNDAMENTALS OF RICE CROP SCIENCE

Yoshida, S.
International Rice Research Institute.
1981, 279 p.

Rice is and will continue to be the primary food source of over half the world's people. This definitive text for students of rice science synthesizes current knowledge on rice physiology and attainment of high yields. Part I traces a rice plant's 3–6 month life, emphasizing the morphology and development of seeds,

seedlings, leaves, culms (stalks), tillerings (branches), roots, and panicles (flower clusters), and explaining ripening, senescence (aging), and yield. Part II describes rice's adaptability to the many different soils and climates of the world's rice-growing regions and details the influence of temperature, solar radiation, and rainfall on rice yield. Part III addresses the mineral nutrition of rice—the advantages of soil submergence; the availability and absorption of nitrogen, phosphorus, potassium, zinc, iron, manganese, sulfur, silicon, hydrogen sulfide, organic acid, iodine, and salts; the correlation between nutrient status and tillering performance; and the importance of nutrients in photosynthesis and respiration. Part IV illustrates the diagnosis and treatment of nutritional disorders (as opposed to nonpathogenic and physiological disorders), especially as applicable to Asia. Part V reviews the characteristics and maintenance of photosynthesis and respiration, focusing on the importance of the latter to the synthesis of such major plant cell components as proteins, lipids, and cellulose. Part VI discusses rice plant characteristics as they relate to yielding ability; identifies the ideal high-yielding plant as one which has short, stiff culms; narrow, thick, erect, dark-green leaves; a short, sturdy stem; and high tillering capacity; and describes modification of varietal traits to conform to less than optimal farm management. Lastly, Part VII presents a physiological analysis of rice yield as a function of the number of spikelets, the percentage of filled (fertile) spikelets, and grain weight, concluding that adequate nitrogen application, minimal culm bending, high solar radiation, moderate (20–35° C) temperatures, gentle winds, sufficient rainfall, and low soil salinity promote higher yields. Appended is a list of 243 references (1924–79).

Paper copy $36.27 Microfiche $3.24

044 **PN-AAJ-870**

AN ILLUSTRATED DESCRIPTION OF A TRADITIONAL DEEPWATER RICE VARIETY OF BANGLADESH

Catling, H.D.; Parfitt, S.
International Rice Research Institute (IRRI).
1981, 8 p.

In IRRI Research Paper Series, No. 60

During a 4-year period (1977–80), Chota Bawalia, a traditional deepwater rice variety of Bangladesh, was studied in the Keraniganj area near Dacca. This report graphically illustrates observed stages of Chota Bawalia's growth with special emphasis on nodes, nodal roots, panicles, and ripening. In addition, the report briefly assesses the impact of flooding regimes and weeding practices on the variety's productivity. Chota Bawalia is grown annually in 1.5 to 3.5 meters of water on several thousands of hectares in the southern Dacca district on the lower Januna floodplain of central Bangladesh. Farmers sow it with the first good rains in April and harvest it after floodwater has receded. Flowering, which is strongly induced by photoperiod, begins the first week of October. During the study, Chota Bawalia was harvested between October 29 and November 1, 1–2 weeks earlier than many other leading varieties. The study revealed that flooding regimes did not seriously submerge Chota Bawalia but did reduce stand density. Rainfall and farmer's weeding practices strongly influenced Chota Bawalia's stand density in the preflood period, due partly to an attack of the yellow rice borer, *Tryporyza incertulas*. Mean yields from 19 crop-cuts at Keraniganj over 4 years ranged from 1.7 to 3.7 t/ha, less than six other leading deepwater rice varieties studied. Chota Bowalia yields were depressed as the maximum water depth approached 2.3 meters. No chemical fertilizer was applied; fertility was provided by leguminous crops, which are widely grown in the winter off-season and by a large complex of algae associated with the culms and nodal roots. Appended is a 4-item reference list (1980–81).

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045 **PN-AAJ-956**

SCREENING STRAINS OF "RHIZOBIUM" FOR THE TROPICAL LEGUMES "CLITORIA TERNATEA" AND "VIGNA TRILOBATA" IN SOILS OF DIFFERENT pH

Zaroug, M.G.; Munns, D.N.
University of Hawaii, College of Tropical Agriculture.
1980, 7 p.

Reprinted from Tropical Grasslands, Vol. 14, No. 1, pp. 28-33

The success of phillipesara (*Vigna trilobata*) and clitoria (*Clitoria ternatea*), two potentially important irrigated forage legumes in the Sudan, will depend on the presence of *Rhizobium* strains able to persist and nodulate effectively in acid soils. This report describes tests of *Rhizobium* strains with phillipesara and clitoria grown in a neutral soil and performance of selected strains with phillipesara in an acid soil. Eleven strains for clitoria and 13 for phillipesara were tested with uninoculated and plus nitrogen (N) checks. Treatments were replicated three times in a completely random design. Large differences were found in the effectiveness of clitoria strains. Four notably successful strains (TAL 173, 29B2, TAL 200, and TAL 305) exceeded the N-treated plants in dry matter production, but the difference was significant only for TAL 173. Nitrogen content also varied between the different treatments with five strains (173, 29B2, 305, 200, and 169) showing N yields not notably less than the N-treated plants. Nitrogen yield, plant color, and dry weight yield gave similar rankings of strain effectiveness. Effectiveness bore little relationship to nodule number, weight, or distribution. Large differences were found in N content and dry matter yield among phillipesara. Effectiveness ranked similarly according to plant dry matter, N content or color, in contrast to clitoria whose nodule fresh weight correlated with N content significantly, and plant yield correlated significantly with both nodule fresh weight and number. Nitrogen yield of the plus-N plants exceeded that from any of the inoculants. While all strains of *Rhizobium* nodulated phillipesara in Goldridge acid soil (except CB1024 which failed completely), no strain gave plant yields as high as the N-control treatment. Liming the Goldridge soil reduced nodulation and also reduced growth in most treatments including the N-control treatment. Ten references (1954–77) are appended.

AID/ta-C-1207 931061300
Paper copy $0.91 Microfiche $1.08

046 **PN-AAJ-030**

NEW LIGHT ON RURAL ELECTRIFICATION: THE EVIDENCE FROM BOLIVIA

Tendler, J.
California University at Berkeley, Institute of International Studies.
1980, 93 p.

Publication No. R80.5

In 1973–74, A.I.D. financed a project to expand existing muncipal electrical systems in Bolivia to seven outlying rural areas with the aim of servicing an additional 81,000 rural customers within 10 years. This report evaluates the project's impact on the rural poor in terms of three project objectives: improving the quality of life; stimulating economic production; and creating viable electric utilities. The project showed that, contrary to conventional wisdom, rural electrification (RE) projects actually favor the poor over the rich because the poor are more numerous and RE projects aim at connecting as many households as possible. RE projects can also benefit the poor by providing them with power use rates subsidized by richer cities, although in this case such subsidies proved unnecessary; greater subsidization of installation costs would have been wiser. However, even though the project provided "household light" that was eagerly welcomed by the poor, the potential to introduce social services, such as health and education, never materialized (potable water was a partial exception) because prior programs in these sectors did not exist. Except in the Santa Cruz area, the project failed to stimulate rural production or slow rural-urban migration because the absence of previous growth led to few production opportunities and because project designers showed no interest in productive uses of electricity —irrigation being a case in point. Finally, despite a 60% success rate in potential electric connections, the project reached only 12–22% of the households in the target area, representing only 7% of Bolivia's rural families. A major reason for this shortfall, in a project aimed at maximizing the number of household connections, was the use of a central grid system that provided unnecessarily high-quality service instead of a less costly system such as independent microhydro generators. The author concludes by noting a two-fold deficiency in the project: a conflict between its goal of maximizing household connections and its capital-intensive and centralized technical design; and an unrealistic production goal due to failure of project designers to seek evidence of economic opportunities in the target areas.

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Paper copy $12.09 Microfiche $1.08

047 **PN-AAJ-096**

TRAINING AGRICULTURAL ECONOMISTS FOR WORK IN INTERNATIONAL DEVELOPMENT

Fienup, D.F.; Riley, H.M.
American Agricultural Economics Association.
1980, 144 p.

Because precise knowledge has been lacking regarding the training needs of the increasing number of developing country students receiving U.S. graduate training in agricultural economics (AE), some 750 developing country alumni of U.S. AE graduate programs were surveyed to determine how they assess their training; analyze the status of AE in developing countries; and map a strategy for improving U.S. AE programs. Respondents to the survey, results of which are presented here, cited the following major strengths of U.S. graduate training programs: comprehensive training in theory and quantitative methods; flexible programs allowing breadth and depth in training; good student-faculty interaction; and a favorable climate for learning and research. Weaknesses cited included insufficient attention to political, social, and institutional factors in development; insufficient application of theory and research methods to developing country problems; inadequate appreciation of the shortcomings of traditional economic theory; too little emphasis on income distribution and equity; and inadequate emphasis on the practical aspects of primary data collection and analysis. AE, it was found, is a relatively new profession in developing countries. Among the four regions cited, Asia has the greatest institutional capacities for AE training, with graduate programs already established in Japan, India, the Philippines, Thailand, South Korea, Taiwan, and Malaysia. The profession is still new in Africa, Nigeria being the most advanced; and graduate programs are emerging in Kenya, Ghana, Tanzania, and Tunisia, already exist in Egypt, and are being revived in Uganda. In Latin America, significant institutional capacities for AE training exist only in Brazil, Chile, and Mexico. Even at best, however, AE training in developing countries is relatively weak due to a scarcity of qualified faculty, materials, and facilities and high faculty turnover to more lucrative jobs in government or with international organizations. These results point to three broad goals for the U.S. AE profession: increasing both developing country and U.S. capability for AE graduate training and establishing professional networks to facilitate cooperative research. Appended are survey questionnaires and data.

AID/ta-BMA-4 931115600

Paper copy $18.72 Microfiche $2.16

048 **PN-AAJ-478**

THE PROJECT CYCLE

Sen, K.C.
University of Wisconsin, Regional Planning and Area Development Project.
1981, 137 p.

State-of-the-Art Paper No. 1

Although the socioeconomic and spatial foci of development projects have been increasingly sharpened, the overall environment in which projects are created and conducted remains complex, diverse, and uncertain. Based on the premise that project development is circular rather than linear, this state-of-the-art paper presents a conceptual framework of the project

cycle, describing various project components and their interrelationship. Specific sections of the report deal with project development (identification, selection, and design); project appraisal (technical, economic, financial, commercial, management, legal, and cultural aspects); project implementation (executing agency, recipients, and donors); and project evaluation. The author concludes that: (1) there is continuous interaction between the project and its environment and among the various aspects of the project; (2) most projects are multipurpose and attempt to achieve their objectives by developing viable institutions; (3) different perspectives and power relationships exist among the various parties involved in a project; (4) project development is a learning process which can provide information useful to other projects; (5) project identification, preparation, and implementation should be based on flexible, iterative, and informal methodologies; (6) project evaluation is an on-going activity occurring both during and after the project; (7) projects should attempt to make use of host country resources, labor, services, and manufactured goods; (8) donors must make systematic attempts to break away from built-in biases toward bigness, capital intensiveness, foreign exchange and import intensity, injudicious cost recovery, and legalism; (9) selective project standardization and replication could help to ease the critical shortage of skilled management personnel in developing countries; and (10) further research is needed on the trickle-down effects of development policies. Appendices discuss basic needs; social impact evaluation and social soundness analysis; appropriate technology; local participation; and project financing, implementation, appraisal, and replicability. A 65-item bibliography (1961–81) is included.

AID/DSAN-C-0060 931113500

Paper copy $17.87 Microfiche $2.16

049 PN-AAJ-817

DEVELOPMENT AND INSTITUTIONALIZATION OF AGRICULTURAL RESOURCE PLANNING CONCEPTS AND PROCEDURES IN DEVELOPING COUNTRIES

Johnson, J.B.
U.S. Department of Agriculture, Natural Resource Economics Division, Economic Research Service.
1981, 100 p.

Policies to improve agricultural production in developing countries require an adequate inventory and analysis of agricultural land resources. This report documents the development and institutionalization under A.I.D.'s Comprehensive Resource Inventory and Evaluation System (CRIES) Project of land resource inventory procedures and of information analysis and management capabilities in the Dominican Republic, Costa Rica, Nicaragua, Syria, and Honduras. For each country, land resources have been categorized according to U.S.-based soil taxonomic concepts with an accompanying description of general climatic conditions. The categorizations developed include Resource Planning Units (RPU's), which are cartographically delineated units of land that are relatively uniform with respect to land form, patterns of soil bodies, and climate; and Production Potential Areas (PPA's), aggregates of individual soil bodies and associated microclimates within an RPU. The major data sources used to establish land use patterns and maps include census data, Landsat imagery, farmer surveys, and inferential estimates based on crop calendars and patterns. Two data management systems have been developed for each country: a Geographic Information System to capture, verify, and analyze mapped information; and an Agroeconomic Information System to collect and analyze socioeconomic data relevant to agricultural planning. These systems can be used to devise economic models, such as linear programming, goal programming with multiple objective functions, and single equation econometric models, to estimate crop area planting responses to government-set target prices. Short-term technical assistance and training, both in-country and in the United States, and the provision of a resident advisor are two methods used to create in-country capability to construct and operate such agricultural resource planning systems. Implementation of project components has been adapted to specific country needs and capabilities. Appended are a Dominican Republic resident advisor's final report and a 37-item (1977–81) bibliography.

PA/AG/TAB-263-14-76 931023600

Paper copy $13.00 Microfiche $2.16

050 PN-AAJ-818

THE RELATIONSHIP BETWEEN THE AREA-FRAME AND CRIES PROJECTS

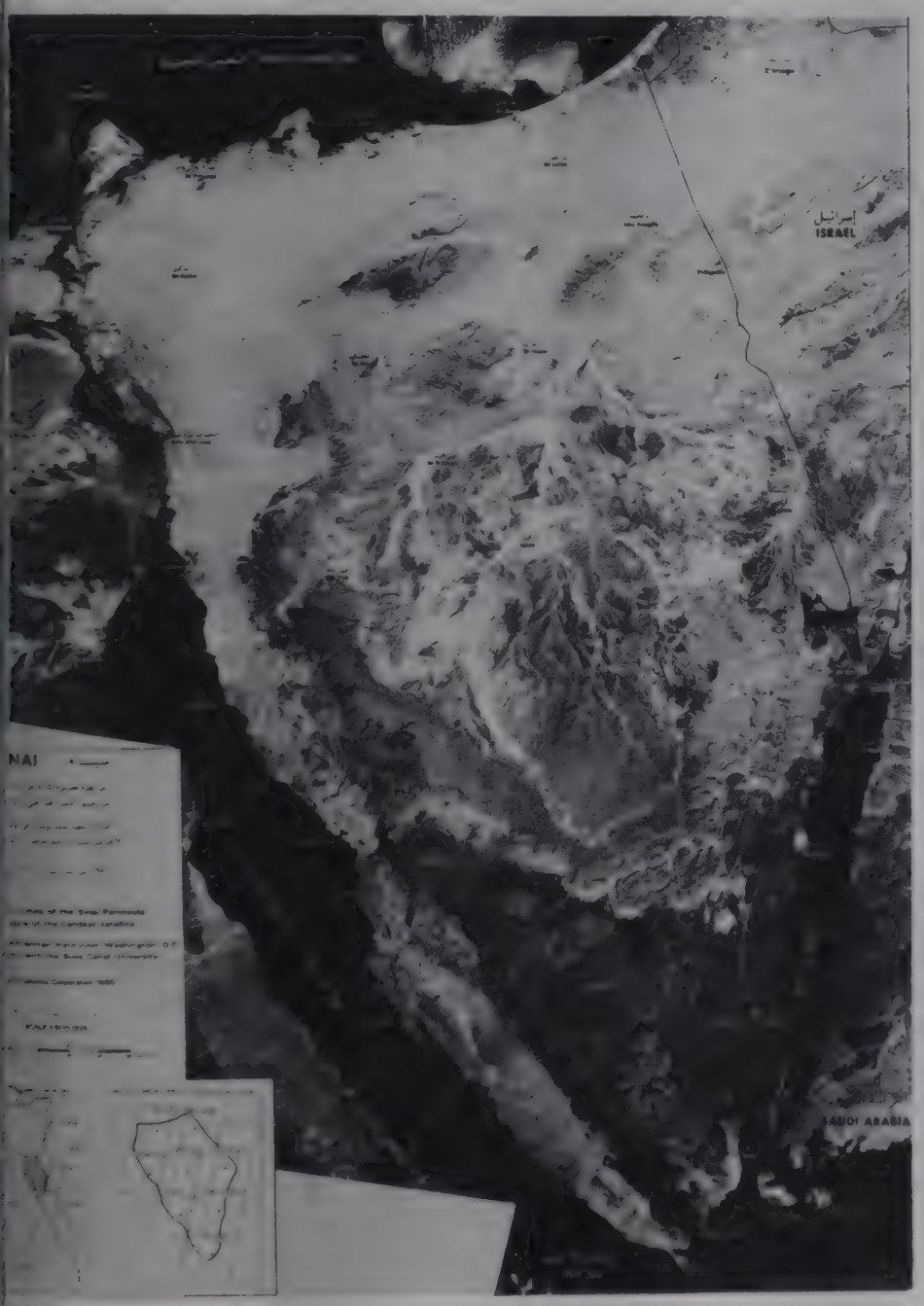
Johnson, J.B.; Schultink, G.; Putnam, J.W.
U.S. Department of Agriculture, Economic Research Service, Natural Resource Economics Division.
1981, 48 p.

Diverse and separately pursued methods are preventing A.I.D.'s Comprehensive Resource Inventory and Evaluation System (CRIES) and Area-Frame (AF) projects from achieving their common aim of helping developing country planners better assess their countries' land potential. To correct this situation, this report compares the two projects and recommends their integration. The CRIES project classifies a country's natural resources (NR) into Resource Planning Units (RPU) and relates land use and agricultural performance data to these units to lay a basis for analyzing policy alternatives. The AF project, on the other hand, expands enumerated data from small and random sample areas to national or subnational levels, providing a statistically reliable account of agricultural performance variables. Both projects employ land use data, including aerial photography and LANDSAT imagery data, as well as medium-scale topographic maps. The CRIES project uses maps on soils, climate, surface water and ground water, etc., to delineate RPU's; while AF projects traditionally use such

data—by means of physical overlay procedures—only to verify the land use patterns used for stratification. Nevertheless, AF projects sometimes computerize the mapped data, while CRIES often uses physical overlay procedures to delineate RPU's, and both projects usually employ computerized information systems. The following recommendations are made for integrating the projects where they are to be implemented concurrently: (1) Both projects should determine country data needs and capabilities, select one topographic base suitable to each and a single geographically-referenced information management system (with one project including topographic/political boundary mapped data), and select classification criteria for a major land use map (with one project interpreting aerial data for the map). (2) CRIES should conduct and evaluate NR inventories and provide AF's with copies of these maps; have AF statisticians provide primary data for CRIES baseline data sets; and provide training in NR data collection, evaluation, and management and, together with AF personnel, in agricultural policy planning techniques. (3) AF should proceed with frame construction and training in project procedures.

PASA/AG/TAB-263-14-76

Paper copy $6.24 Microfiche $1.08



051 **PN-AAJ-924**

ECONOMIC AND SOCIAL DEVELOPMENT IN WEST AFRICA

Agency for International Development, Regional Economic Development Support Office, West Africa.
1979, 73 p.

West Africa, extending from Cape Verde to Zaire, includes 22 countries with a total land mass larger than that of the United States, but with a smaller population (190 million) and a GNP only as large as Switzerland's ($63 billion). This report provides a brief overview of development in West Africa (in terms of demography, quality of life, agriculture, economic growth and income distribution, trade, debt service, and foreign assistance) and discusses areas of development assistance. Although most of the region's labor force is engaged in agriculture, population increases have outpaced increases in food staple production. This, combined with drought, cattle disease, inadequate agricultural infrastructure, and a shortage of trained manpower, has increased West Africa's food dependency. In fact, food imports throughout the region will have to increase five or six times above the 1975 level if past production trends continue. This condition is particularly pronounced in the Sahel, an area whose agricultural production has increased by less than 1% annually over the last 10 years. Taking note of this, A.I.D. expends more per capita in the Sahel than in any other region in the world. Adding to development problem, the oil price explosion in 1973 caused a 70% increase in posted oil prices and led to a total current account deficit for West Africa of approximately $1.2 billion. Thus, the costs of food and fuel have been the major constraints to West African development because they rob nations of the foreign exchange needed to pay for the large foreign components of domestic programs. Donor programs should first be geared toward increasing production of staples. Also, because West African nations cannot finance the recurring costs of most international donor programs, immediate short-term productivity increases should be emphasized to give West African governments a larger tax base. Also discussed are needs and A.I.D. strategies in regard to livestock, rural development, food aid, transport, river basins, health, nutrition, women, human resources, population, housing, environment, and energy.

Paper copy $9.49 Microfiche $1.08

Remote sensing satellites provide important data for crop, water, and land management. This photograph is a digitally-enhanced mosaic of eight LANDSAT images of the Sinai. Similar mosaics are used to develop natural resource inventories in CRIES and Area-Frame projects.

052 **PN-AAH-785**

LIVESTOCK VERSUS FOOD GRAIN PRODUCTION IN SOUTHEAST UPPER VOLTA; A RESOURCE ALLOCATION ANALYSIS

Delgado, C.L.
Michigan University, Center for Research on Economic Development.
1979, 447 p.

Contrary to conventional wisdom, West African Sahelian peasant farm income would not rise significantly if separate crop and livestock enterprises were integrated into a single farm operation. This report, part of a 3-year study of West African livestock economics, documents a 13-month farm management survey of 41 Mossi and Bisa farm households and a concomitant 5-month survey of 20 Fulani herdsmen in the Tenkodogo area to test the viability and income-generating capacity of integrating cattle raising into smallholder agriculture. Detailed in this report is farm-level information on labor flows, land use patterns, grain production, cattle labor requirements, and livestock ownership patterns for the 1976–77 agricultural year. A linear programming model is used to identify optimal production strategies and resource constraints under varying assumptions concerning farmers' desires for self-sufficiency in food grains. The study tests and validates the hypothesis that due to the high opportunity cost of seasonal labor in terms of food grain production loss, the desire for self-sufficiency in millet, and the high seasonal labor requirement for grazing and supervising animals, revenue-maximizing Mossi and Bisa farmers will entrust their animals to specialized Fulani herdsmen rather than care for the animals themselves. Similar conclusions would apply to other West African Savannah regions as well, as long as a cattle entrusting option exists, area population density is high, a suitable forage crop is nonexistent, there is a lack of agro-industrial by-products for use as feedstuffs and of effective means of relieving seasonal labor bottlenecks, and land tenure and soil conditions are unfavorable to animal traction. The main policy recommendation for Tenkodogo and similar areas is to use development funds available for cattle production intensification to support the cattle entrusting system rather than encourage stockraising by sedentary peasants. To promote cattle production intensification in areas without a cattle entrusting option, there must be improvement in food grain production methods (e.g., by increasing returns to labor, eliminating labor bottlenecks, etc.). An approximately 160-item bibliography (1924–78) in English and French and survey data are appended.

AID/afr-C-1169 625090600
Paper copy $58.11 Microfiche $5.40

053 **PN-AAH-879**

FORMAL CREDIT FOR FARM AND NON-FARM ENTERPRISES IN RURAL AREAS OF THAILAND

Meyer, R.L.
Ohio State University, Department of Agricultural Economics and Rural Sociology.
1980, 36 p.

Economics and Sociology Occasional Paper No. 713; Presented at Workshop on Rural Finance, Kathmandu, Nepal, 1980

An overview of recent developments in Thailand's rural financial structure shows that major improvements in extending formal credit to farms have been effected but that similar efforts for nonfarm rural enterprises are sorely lacking. This report reviews recent credit activities in Thailand relating to both rural farm and nonfarm enterprises and discusses reasons why activities for the latter have lagged. Specific government policies enacted to direct credit to rural areas include authorizing the Bank of Thailand to rediscount promissory notes issued from agricultural transactions; adopting a quota system whereby commercial banks were required to lend from 5% to 13% of their previous year's earnings to agriculture; and requiring new bank branches to lend at least 60% of their deposits to local enterprises and to make one-third of their loans to farmers. The impact of these and other policies over the course of 10 years was to increase the number of banks with agricultural portfolios from 5 to 16, increase agriculture's share of total lending to 5.5%, and extend formal credit to about 20% of Thai farmers. Conversely, nonfarm rural enterprises, i.e., pottery making, tailoring, and agricultural processing, which contribute significantly to total rural employment and income and to total output in some sectors, depend largely on informal credit sources which are thought to be less stable and more costly. This discrepancy is primarily due to political and geographical factors. Due to larger and more visible numbers of farmers and the urban population's dependency on plentiful agricultural bounty, the farm population has more political clout than do the less organized nonfarmers. To increase the amount of formal credit for nonfarm rural enterprises, the authors recommend: (1) restructuring the government-owned Small Industries Finance Office to help identify the nature of small sector credit demand and pinpoint enterprises with the potential for expansion; (2) analyzing problems of lending to the small-scale sector; and (3) reviewing other Asian country experiences in providing support to their small-scale sectors. Appended is an 18-item reference list (1972–79).

AID/ta-BMA-7 931116900
Paper copy $4.68 Microfiche $1.08

054 **PN-AAH-880**

RURAL FINANCIAL MARKETS AND DEVELOPMENT IN LOW-INCOME COUNTRIES: SOME INSIGHTS FOR THE UNITED STATES?

Adams, D.W.
Ohio State University, Department of Agricultural Economics and Rural Sociology.
1980, 17 p.

Economics and Sociology Occasional Paper No. 712

Despite the prosperity of U.S. rural financial markets (RFM), recent criticism has been aimed at developing country RFM's patterned after U.S. models. This paper explains why developing country RFM's have excluded small rural borrowers and identifies similar trends now appearing in U.S. RFM's. After noting the importance of RFM's in facilitating heterogeneous transactions at minimal cost, the author points out that developing country RFM's, despite heavy assistance from foreign donors, are financially weak. This problem stems, in his view, not from deficiencies inherent in the RFM's, but from development policies and political manipulation combined with inflation. The sanctioning of low interest rates requires RFM's, in times of inflation, to absorb negative returns, thus eroding their assets and forcing them to ration their services through nonmarket means, i.e., selecting only borrowers who have excellent collateral, are previous customers with good repayment records, and can provide a cosigner; and excluding poor borrowers by requiring bribes, delaying loan applications, and charging costs normally assumed by the lender, e.g., loan application fees. In addition, inequitable government policies are often imposed on rural entrepreneurs, e.g., overvalued exchange rates and price ceilings which depress RFM growth and create an unfavorable savings and investment environment. RFM's are also subject to manipulation by the politically powerful, especially when funds are sought from the central bank or the government during times of economic depression. By contrast, the vigor of the U.S. agricultural sector since the late 1930's has kept U.S. RFM's strong. Recent slowdowns in farm productivity, however, and the use of grain embargoes as foreign policy weapons, together with inflation and the regulation of some rural interest rates, also threaten this market. The author concludes by suggesting that, since financial instruments are liquid and naturally flow to areas of the greatest return regardless of political fiats, policymakers should focus on improving rather than on controlling the RFM process.

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Paper copy $2.21 Microfiche $1.08

055 **PN-AAH-882**

AGRICULTURAL CREDIT AND RURAL PROGRESS IN JAMAICA: A DEVELOPMENT DILEMMA

Graham, D.H.; Bourne, C.
Ohio State University, Department of Agricultural Economics and Rural Sociology.
1979, 39 p.

Economics and Sociology Occasional Paper No. 633

Jamaica's use of agricultural credit in the past decade exemplifies a classic conflict between bankers and development planners. In describing the conflict, this report examines and evaluates Jamaica's: (1) economic stagnation since the early 1970's (after a short period of reasonable growth) and the effect of this decline on the financial sector; (2) national credit systems' growth, institutional features, and aggregrate performance; and (3) public and commercial credit institutions and programs. During this period, Jamaica's major credit services were the commercial banks (dominated by foreign interests), the Agricultural Credit Board, the Jamaican Development Bank (JDB), the Self-Supporting Farmers' Development Program (SSFDP), and the Crop Lien Program (CLP). Larger farmers were serviced by the JDB and the ACB; small farmers were serviced by the CLP and (indirectly) the ACB; and medium farmers were serviced by the SSFDP. Overall, mainly larger farmers benefited from the credit programs. Although Jamaican planners designed these programs to increase domestic foodstuff production, they did not emphasize loan repayments, thereby turning the loans into income transfers. Foodstuff production increased but both large and small farmer loans are now seriously in arrears. As seen in the SSFDP, bankers emphasize institutional viability over farmer production; require strict loan disbursement and monitoring (especially with small farmers) and an interest rate that covers program costs; and keep arrears low through strong collateral and foreclosure policies. Caught between the opposed perspectives of planners and bankers, the development banks have compromised their financial viability and institutional credibility and now face a painful retrenchment period as they recover loans, foreclose on properties, and reschedule loans of salvageable projects. Given Jamaica's current economic and financial constraints, the supply of agricultural credit will increase slowly and service fewer small farmers. The costs, difficulties, and inequities of Jamaica's attempt to deliver public sector credit to small farmers suggests it is better to invest public resources in a package of agricultural policies including subsidized inputs, minimum price supports, and marketing arrangements.

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056 **PN-AAH-884**

TESTING AN OFF-FARM LABOR SUPPLY MODEL IN A LESS DEVELOPED COUNTRY

Smith, D.A.; Meyer, R.L.
Ohio State University, Department of Agricultural Economics and Rural Sociology.
1979, 15 p.

Economics and Sociology Occasional Paper No. 615

Although studies have shown off-farm labor (OFL) to be a key source of income for poor rural families in developing countries, the effect of off-farm wage rates on OFL supply remains unclear. This paper reports on a test of a model for analyzing this issue using data from 188 rural households in the Philippines. In the model, the time allocated to OFL by husbands and wives is a function of own on-farm and off-farm wage rates, nonearnings income, and several environmental variables noted below. Of husbands and wives surveyed, 25% and 12%,

respectively, performed OFL. While husbands, however, averaged 100 days annually whether their wives worked or not, wives worked twice as many days off the farm when their husbands did not work off the farm. Children spent a surprising amount of time in OFL (except where both parents did so), contributing 70% of all OFL and 50% of all off-farm income. Off-farm earnings averaged 13% of household earnings, 40% where both spouses worked. Using Tobit analysis, regression results were estimated for both husbands and wives; the former are presented in this report. It was found that: (1) wage substitution effect outweighs wage income effect; (2) response to increased off-farm wages is highly elastic; (3) farm size affects OFL negatively; (4) young and older children perform more OFL; (5) a husband substitutes for the wife's OFL when she cares for young children; (6) own on-farm wage rates, wife's on-and off-farm wage rates, nonearnings income, machinery, number of children 7–15, and dwelling size were insignificant, though predictable, variables. The similarity of predicted and observed probability of OFL and total labor supply increased confidence in the model. Results suggest that area small farmers respond to wage rates in allocating household labor time and that farm and household characteristics are significant in explaining response to off-farm wage rates. The model needs to be refined to include children's wage and time allocation and their impact on adult labor supply; to analyze the process of household response to OFL opportunities; and to relate successful OFL to migration decisions. An 11-item bibliography (1958–78) is appended.

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Paper copy $1.95 Microfiche $1.08

057 PN-AAH-885

RURAL NONFARM EMPLOYMENT: THE RECENT EAST ASIAN EXPERIENCE

Meyer, R.L.; Larson, D.W.
Ohio State University, Department of Agricultural Economics and Rural Sociology.
1978, 24 p.

In Journal of Economic Development, Vol. 3, No. 1, 1978, pp. 91-112; Economics and Sociology Occasional Paper No. 484

Although small, rural, nonfarm firms (SRNF) are often overlooked by development strategists and have often suffered from discriminatory government policies, recent evidence suggests that SRNF's may be able to contribute significantly to farm family income and the national economy. This paper exemplifies this thesis in light of recent East Asian experience. A literature review shows that East Asian SRNF's, in contrast to larger, more "modern" enterprises, employ substantial unskilled and uneducated labor (20–30% of the labor force and more), use local resources, are less capital-intensive, require little foreign exchange, reduce interregional inequities, improve income distribution, encourage investment in agriculture, produce exports, and help link the product and labor markets to small farms. In Taiwan, Japan, and South Korea between 1960 and 1975, income earned from SRNF's accounted for 50–90% of total income for families with small farms (under 0.5 ha) and 15–30% of family income for farms over 2 ha. A survey of 329 rural Taiwanese families in 1973 indicated that relatively higher off-farm wages, small farm size, greater education, a large number of adults per household, farm mechanization, and rice and livestock farming (versus more labor-intensive vegetable, fruit, and tobacco farming) were all conducive to greater off-farm employment. The cost of commuting, at least in Taiwan where distances are short, was not a factor. After noting that these facts should induce governments to eliminate their entrenched bias in favor of large firms, the authors conclude by reviewing strategies proposed to promote SRNF's, e.g., revising commercial bank credit policies; increasing services to SRNF's by development banks; and establishing specialized SNRF financing institutions. Alternative strategies suggested by the authors include: (1) introduce farm mechanization to release labor for both increased farm and non-farm work; (2) increase rural educational opportunity; (3) improve rural transportation and encourage industrial decentralization to reduce, where necessary, commuting costs; and (4) study the broader, long-run consequences of SRNF promotion. A 31-item bibliography (1961–76) is appended.

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Paper copy $3.12 Microfiche $1.08

058 PN-AAH-886

MEASURING THE IMPACT OF AND DEMAND FOR AGRICULTURAL CREDIT; AN ANNOTATED BIBLIOGRAPHY

David, C.C.; Meyer, R.L.
Ohio State University, Department of Agricultural Economics and Rural Sociology.
1979, 25 p.

Economics and Sociology Occasional Paper No. 597

The extensive use of formal credit to promote agricultural development in low-income countries has not led to expected improvements in farm income, production, and income distribution. Some researchers have even argued that certain policy instruments, especially concessionary interest rates, are responsible for the unsatisfactory performance of these credit programs. This annotated bibliography contains 83 references (1958–78) which examine the problem of agricultural credit programs, especially in low-income countries, from a two-fold viewpoint: the impact of agricultural credit at the micro-level, and the factors affecting the demand for credit. English sources predominate, although Spanish titles are also included. Most of the bibliographic items are micro-level and empirical in nature, although a number of theoretical analyses of the role of financial intermediation at the macro- and micro-level are also listed. Only the more recent and easily accessible descriptive studies which dominate the empirical literature are included, even though many other descriptive studies are available, according to the authors, as government reports or graduate student

theses. Coverage of the more analytical studies, using econometric and programming methods, is more complete and includes a few U.S.-based analyses illustrating possible methodological approaches. Included are two recent articles by the authors which discuss key conceptual and methodological problems of credit supply and demand. A synopsis of each entry is provided.

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Paper copy $3.25 Microfiche $1.08

059 **PN-AAH-887**

RECENT PERFORMANCE OF RURAL FINANCIAL MARKETS IN LOW-INCOME COUNTRIES

Adams, D.W.
Ohio State University, Department of Agricultural Economics and Rural Sociology.
1979, 28 p.

Economics and Sociology Occasional Paper No. 596

Despite a substantial expansion in the past 30 years, rural financial markets (RFM) have contributed little to development in low-income countries. To bolster this controversial thesis, this paper reviews the recent poor performance of RFM's and identifies its causes. RFM expansion has been based on a supply-side strategy in which RFM's are force-fed large amounts of funds by central banks and interest rates are made concessionary for farmers, especially poor, small farmers. Underlying this strategy are several common assumptions: that farmers need low-income credit and cannot generate voluntary savings; that informal lenders provide the majority of farm credit—at exorbitant interest rates—and that formal lenders do and should provide credit for production purposes only; and that RFM performance can effectively be controlled by government fiat. These assumptions have led to several common problems: erosion of credit portfolios due to inflation or fixed interest rates; high default rates; reticence to lend to farmers or the rural poor; inadequate availability of medium- and long-term loans; ineffectiveness in mobilizing voluntary savings; high loan transaction costs; adverse effects on income distribution and asset ownership; and general lack of coordination and difficulty in introducing credit innovations in RFM programs. Governments use varying strategies to control RFM's: creating new institutions for special groups; increasing loan supplies; nationalizing formal RFM's; and establishing loan size limits, lending quotas, loan guarantees, or concessionary interest rates for the poor. A strategy very widely used (especially to channel foreign capital) is to have central banks rediscount loans made for select purposes at below-normal rediscount rates. The author points out the weaknesses of these strategies and suggests some major and long-overdue policy changes in the use of RFM's: initiate programs to mobilize voluntary savings; adopt flexible, nominal interest rate policies; use interest rate policies and other incentives to induce RFM's to serve rural needs; de-emphasize concessionary interest rates and allocation of loanable funds by administrative fiat; and raise interest rates of formal RFM's. A 26-item bibliography (1949–79) is appended.

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Paper copy $3.64 Microfiche $1.08

060 **PN-AAH-888**

MEASURING THE FARM LEVEL IMPACT OF AGRICULTURAL LOANS IN LOW INCOME COUNTRIES: A REVIEW ARTICLE

David C.C.; Meyer R.L.
Ohio State University, Department of Agricultural Economics and Rural Sociology.
1979, 37 p.

Economics and Sociology Occasional Paper No. 602; paper presented at Workshop on Rural Financial Markets and Institutions, Wye, England, 1979

Theoretical problems prevent empirical studies from accurately assessing the impact of farm credit on farm production in low-income countries. This paper identifies these problems and suggests ways to improve farm credit impact research. A review of selected farm credit impact studies (descriptive, econometric, and mathematical) reveals that most studies have three main methodological problems: (1) They use the farm as the basic analytical unit while neglecting the interdependence of farm household (FH) production/consumption activities. (2) They fail to recognize the fungibility of money. Credit ostensibly obtained for production purposes may in fact be used for non-production purposes such as consumption or investment. (3) They have not accurately resolved the atribution problem, that is, been able to separate the effect of credit on farm production from that of other causal factors. Input and output prices, production technology, and managerial constraints, for example, may all cause differences between borrowers and non-borrowers or before and after borrowing. Especially important is nonprice rationing of credit resulting in the concentration of loans to larger, more well-established farmers. These theoretical inadequacies, in the author's view, underlie the farm resource allocation model currently in general use and lead to an under- or over-estimation of the true impact of farm credit. To improve research on farm credit impact, the most immediate need is to establish a more detailed data base by collecting quantified data on the sources and uses of FH liquidity; monitoring production expenses, investment, consumption and non-farm activities to accurately describe liquidity allocation (cross-sectional surveys are not suitable for this purpose); and collecting longitudinal data, especially from panel households, even at the expense of smaller sample size. A cost-benefit comparison of credit to other policy instruments would probably show that credit, although less cost-effective, is preferred because it is more easily administered, more controllable by larger farmers, and enables assistance agencies to meet lending quotas. A 45-item English and French bibliography (1956–78) is appended.

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Paper copy $4.81 Microfiche $1.08

061 PN-AAH-889

MOBILIZING HOUSEHOLD SAVINGS THROUGH RURAL FINANCIAL MARKETS

Adams, D.W.
Ohio State University, Department of Agricultural Economics and Rural Sociology.
1978, 15 p.

In Economic Development and Cultural Change, Vol. 26, 1978, pp. 547-560

Contrary to the usual assumptions that rural families in low-income countries are either too poor to save or spend their surplus income on consumption or ceremonial sprees, this paper argues that rural households have substantial voluntary savings capacities and that rural financial markets (RFM) can strongly influence both the form and the amount of savings. According to the author, the amount of farm income saved depends on both household consumption and farm production. Although the interaction between these factors is complex and hence difficult to quantify, one can generally assume a close inverse relationship between the rates of return expected on savings and the amount of income allotted to consumption. RFM's can influence family financial behavior by increasing liquidity, e.g., through credit, for both production and consumption and by offering attractive interest rates for savings. Data from Taiwan, Japan, Korea, Malaysia, and India indicate that rural households possess a significant savings capacity. There are three strong reasons, according to the author, for mobilizing this capacity: (1) rural savings may help strengthen a country's overall financial market; (2) savings can strengthen the local service institutions which are often weakened by concessionary interest rates and so help bridge the gap between national organizations and individuals; and (3) increased savings lead to decreased household consumption. A two-level strategy to mobilize voluntary savings is suggested. At the national level, a flexible interest rate structure is needed, e.g., one that incorporates tax exemptions on interest for certain types of deposits or indexes return rates according to inflation, along with legal changes to permit cooperatives and other local institutions to handle credit and savings activities and to integrate these institutions into regular financial markets. Initiation of a nationwide deposit insurance program is also needed. On the local level, the key need is to promote attractive return rates. Programs to promote savings, it is noted in conclusion, are best pursued in areas where agricultural growth and increased income are occurring.

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Paper copy $1.95 Microfiche $1.08

062 PN-AAH-890

SAVINGS DEPOSITS AND CREDIT ACTIVITIES IN SOUTH KOREA AGRICULTURAL COOPERATIVES 1961-1975

Lee, T.Y.; Kim, D.H.; Adams, D.W.
Ohio State University, Department of Agricultural Economics and Rural Sociology.
1977, 15 p.

In Asian Survey, Vol. 17, No. 12, 1977, pp. 1182-1194

Rural cooperatives can mobilize rural voluntary savings. Such is the major conclusion of this review of South Korea's rural cooperative system in terms of its historical credit/savings achievements, financial services offered by three cooperatives (Daeson, Chojeun, and Ochang), and cooperative member attitudes regarding savings. Loans generated by the system increased four-fold from 1961 to 75 and were predominantly for agriculture, e.g., 75% of 1975 lending. The change in 1965, from inflexible interest rates to rates tied to inflationary pressures, had a dynamic impact on rural lending and deposits. Prior to 1965, rates on farm loans and deposits hovered, respectively, between 8–15% and 9–15%. Following 1965, rates on both deposits and loans almost doubled. In addition, the promotion of savings mobilization resulted in significant deposits in rural cooperatives. For instance, between 1964 and 1966, total deposits tripled because farm-households placed more of their financial and liquid assets in financial instruments. Voluntary savings deposits were also mobilized much more quickly than involuntary share purchases. Since 1966, savings deposits have accounted for 66% of cooperative deposits. In all three cooperatives examined, outstanding loans and deposits have increased rapidly since 1966. Savings mobilization programs included installment savings, deposits in kind, and mutual installment deposits. Demand deposits, fixed deposits, and other deposits totalled 75%, 20%, and 5% respectively. Sample interviews to determine cooperative member's attitude toward savings revealed that half of the deposits were to increase liquidity for farm or household transactions, while the other half were for investment purposes such as education and land purchases. Deposit behavior was primarily affected by interest rates on savings or by available investments. In 1975, members placed 95% of their deposits in cooperatives, substantiating the latter's safety and convenience. In addition to the major role which cooperatives can play in mobilizing rural savings, it may be concluded from the study that the poor have a greater savings potential than previously believed; that government policies, especially interest-rate policies, affect savings mobilization; and that rational credit-savings activities can help build viable, small farmer cooperatives.

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Paper copy $1.95 Microfiche $1.08

063 **PN-AAH-891**

GROUP LENDING TO THE RURAL POOR IN THE DOMINICAN REPUBLIC: A STUNTED INNOVATION

Adams, D.W.; Pablo, A.A.
Ohio State University, Department of Agricultural Economics and Rural Sociology.
1980, 29 p.

Economics and Sociology Occasional Paper No. 682

Many financial innovations in low-income countries prove abortive due to countervailing national policies. This report discusses one such innovation—group lending—and identifies the cause of its limited success in the Dominican Republic. Against a background of the purported advantages of group lending (a lowering of default rates and technical assistance and transaction costs) and Dominican Republic interest policies, group lending initiatives of the Dominican Development Foundation (DDF), one of the first credit organizations in the world to experiment with group lending, are analyzed. DDF has the largest group lending program in the Dominican Republic, providing production loans to groups of farmers lacking access to other formal credit sources. A recent study of a representative DDF initiative in Pablo illustrates the strengths and weaknesses of the DDF program. The study showed that group lending lowered both transaction and technical assistance costs, but that the costs to the DDF of forming and serving new and poorer groups (including the cost of collecting delinquent loans) were substantial. Joint liability worked as a sanction to encourage loan repayment with well-formed groups, but such sanctions proved ineffective with groups formed solely to obtain access to the loan or where the group had difficulty in obtaining the loan. To encourage commercial group lending, DDF initiated a loan guarantee program, covering defaults on a declining percentage basis over a 3-year period. After initial success, the program failed when banks pulled out of the program due to increased inflation and a jump in returns from loans to other sectors. DDF now faces increasing default rates, a decrease in the quality of its services, and reduced lending funds. The concessionary interest rates promoted in the Dominican Republic to spur agricultural production seem to be a major reason for DDF's problems. A six-item bibliography (1968–79) is appended.

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Paper copy $3.77 Microfiche $1.08

064 **PN-AAH-892**

FUNDING AND VIABILITY OF RURAL DEVELOPMENT BANKS

Bourne, C.; Graham, D.H.
Ohio State University, Department of Agricultural Economics and Rural Sociology.
1980, 28 p.

Economics and Sociology Occasional Paper No. 720

Using the Jamaican Development Bank as an example, this paper examines the impact of existing funding sources on the viability of rural development banks (RDB) in low-income countries and suggests new sources for RDB funding. Currently, the two major funding sources for RDB's are foreign and domestic governments. The terms imposed by these sources, however, (as well as by subsidiary sources such as private financial institutions), significantly restrict RDB credit policies and operational efficiency in ways that can affect RDB viability. Such restrictions are the recommendations, usually accepted by RDB's, that RDB clients adopt modern technology, or that financing of short-term working capital be prohibited, or that lending be made at concessionary interest rates. Taken together, these restrictions create a bias in favor of labor-displacing imported capital goods and larger farmers. Concessionary interest rates in particular lead, according to the World Bank, to resource misallocation, wealth gains by larger farmers, losses for RDB's, and political corruption and abuse. In addition, the tendency by RDB sources to extend funds on the basis of loan disbursement rather than on loan management quality encourages RDB's to accelerate disbursements without paying sufficient attention to clients' credit worthiness. This ultimately leads to an evaporation of external source funding, undermining the RDB's long-term viability. One solution to these problems is to develop new sources of funding that are not subject to the above limitations. Three such possible sources are examined: deposit mobilization, which would afford RDB's a steady return flow of funds; the use of local and foreign bond issues; and earmarking government revenues. It is concluded that the first two of these are preferable and are also potentially more successful methods of funding, provided they are intitiated at an early stage in a RDB's life-cycle. A list of 8 references (1971–78) is appended.

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Paper copy $3.64 Microfiche $1.08

065 **PN-AAH-893**

RECENT ECONOMIC GROWTH AND RURAL FINANCIAL MARKETS IN JAMAICA: ANALYSIS OF PERFORMANCE, PROBLEMS AND RECOMMENDATIONS

Graham, D.H.; Bourne, C.; Begashaw G.
Ohio State University, Department of Agricultural Economics and Rural Sociology.
1978, 179 p.

Against a background analysis of the Jamaican economy's accelerating decline from 1965 to 1978, this paper studies the recent performance of Jamaica's rural financial markets (RFM's). From 1970 to 1977, credit increased rapidly, 6.7 fold, in nominal terms, but real growth was only 2.6 fold. Most of the increase came from new programs such as the Self-Supporting Farmer's Development Program (SSFDP) and the Jamaican Development Bank (JDB) with the help of foreign funds as inflation eroded the credit base in older domestic sources such as the Agricultural Credit Board (ACB). This rapid increase in

credit within a declining economy has led to delinquency and arrears which have compromised future access to foreign funding sources, and to negative real interest rates which have benefitted large farmers while undermining the viability of the credit institutions themselves. More detailed analysis of the performance of the commercial banks, the overall main source of farm credit; the JDB, the major vehicle for official farm credit; and the three government programs designed to provide small farmer credit—People's Cooperative Banks (PCB), the SSFDP, and the Crop Lien Program (CLP)—confirm the above conclusions. Analysis of the impact of public financial policies on RFM's leads to the conclusions that government assistance has been irregular and has directly benefitted only a narrow range of industries and that central banking policies have not succeeded in providing an adequate flow of private sector credit to agriculture. A final section discusses the main problems caused by the above factors: negative interest rates that benefit large farmers and penalize savers; inefficient use of credit and arrears by large farmers, due to lax loan administration; and high delinquency rates that threaten the viability of the small farmer credit programs. Recommendations include raising interest rates according to the rate of economic recovery; improving loan appraisal and collection procedures, especially of the JDB; and transferring parts of the CLP to the SSFDP and of ACB-PCB services to the Ministry of Agriculture while supporting ACB-PCB's participation in the new Farmer Savings Program. Specific areas of USAID/J assistance are suggested.

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Paper copy $23.27 Microfiche $2.16

066 **PN-AAH-894**

A CRITIQUE OF TRADITIONAL AGRICULTURAL CREDIT PROJECTS AND POLICIES

Adams, D.W.; Graham, D.H.
Ohio State University, Department of Agricultural Economics and Rural Sociology.
1980, 26 p.

Despite good intentions, a majority of developing countries' rural financial market (RFM) projects have generally contributed to overall resource misallocation, inequitable wealth distribution, and political sabotage. This paper reviews common problems and erroneous assumptions associated with RFM projects, outlines new policy approaches and suggestions for making improvements, and offers explanations as to why new ideas may not be accepted by local policymakers. Many of the problems cited, such as loan repayment delinquencies, medium- and long-term formal credit unavailability, high loan transaction costs, and credit flow distortions, are due mainly to inaccurate assumptions about how RFM's operate and about the factors which determine borrower and lender behavior. Credit institutions are created and RFM policies designed largely in response to beliefs that the rural poor cannot save and therefore will not respond to saving incentives; that most farmers need cheap loans before they will adopt new technologies or make major investments; that informal lenders charge exorbitantly high interest rates; and that cheap credit is an efficient way of off-setting production disincentives such as low product and high input prices. Based on converse assumptions about RFM's, the authors forcefully argue the merits of stable and positive interest rates which allow profitable returns to both lenders and borrowers and reduce inflationary speculation; suggest designing policies to guarantee loans or adjust reserve requirements to stimulate lending to target populations rather than injecting exogenous credit into the system; and recommend that RFM's be induced to lower the social costs—caused by bureaucratic red tape—of financial intermediation. The most important of the explanations offered for the intransigence of RFM policymakers is that the local political system is satisfied with RFM performance because it gives political leaders tools with which to allocate "spoils" to favored patrons. Assistance agencies are urged to counteract inefficient and distorting RFM policies by conditioning their assistance with requirements for positive real interest rates. Appended is an 18-item reference list (1959–79).

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Paper copy $3.38 Microfiche $1.08

067 **PN-AAH-898**

STRUCTURE AND PERFORMANCE OF RURAL FINANCIAL MARKETS IN THE PHILIPPINES

David, C.
Ohio State University, Department of Agricultural Economics and Rural Sociology.
1979, 37 p.

Economics and Sociology Occasional Paper No. 589

Small farm production in developing countries often depends on the ability of rural financial markets to provide farmers with access to credit. This paper examines the structure and performance of such markets, especially supervised credit programs (SCP), in the Philippines in terms of credit delivery, loan repayment, and impact on farm productivity and income. With the implementation of SCP's such as Masagana 99, farm lending by public and private banks increased during the 1960's, then declined in real terms during the 1970's. Private institutions (development, rural, and commercial banks and savings and loan associations) continue to dominate farm lending, although their share has declined relative to public lenders such as the Philippine National Bank (PNB) and the Development Bank of the Philippines. Rural banks, encouraged by incentives, e.g., tax exemptions, and the PNB have led SCP activities. Informal markets such as moneylenders, friends, and relatives, have also been active, although on a declining basis relative to formal lenders. Under SCP's, supervision and group lending increased administrative costs without reducing delinquency rates. Distribution of credit under SCP's has not favored

The loan this Filipino farmer is receiving from a Laguna Rural Bank under a rice production credit program of the Philippine Central Bank will be used for costs incurred in transplanting, weeding and harvesting high-yield rice seedlings.

the small farmer, nor have SCP's significantly increased farm productivity and income. The study concludes by recommending increased emphasis on establishing viable rural financial markets by using more flexible interest rates and by increasing flexibility in loan use and timing. Improved resource allocation within farm households, an increased ability by rural banks to mobilize savings, and lowered administrative costs and default rates are presented as potential benefits of these policy changes. It is also noted, however, that further research on borrower and lender behavior is needed to influence policy-makers to adopt these changes.

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Paper copy $4.81 Microfiche $1.08

068 PN-AAH-899

LENDING TO RURAL POOR THROUGH INFORMAL GROUPS: A PROMISING FINANCIAL MARKET INNOVATION?

Adams, D.W; Ladman, J.R.
Ohio State University, Department of Agricultural Economics and Rural Sociology.
1979, 8 p.

Economics and Sociology Occasional Paper No. 587

Informal group lending is a recent innovation introduced to increase the rural poor's share of agricultural credit in developing countries. To help determine the value of this innovation, this paper examines five advantages claimed for group lending. (1) The claim that joint liability (peer pressure on recalcitrant members) provides lenders with loan security is generally untrue. In many countries, e.g., the Philippines, groups are hastily formed to gain access to credit and thus lack the solidarity needed to generate peer pressure. Repayment is high where preexisting groups borrow and when a percentage of a loan is placed into a blocked, interest-bearing account held by the lender. Studies suggest that the quality of loan services (e.g., loans arriving on time) affects the borrowers' willingness to repay. (2) The claim that group lending lowers lender costs requires clarification. The direct cost of making, administering, and collecting the loan can indeed be reduced, especially when technical assistance is provided by national extension services, but the lender may also have to absorb the costs of technical assistance needed to form a group. These latter costs are reduced when lenders generate groups from existing organizations, e.g., in Nepal. (3) Few data exist to substantiate or disprove the claim that group lending improves the efficiency of technical services. Although groups in regional or pilot projects do receive timely assistance, assistance offered through national extension services is inadequate. When assistance costs are assumed by an outside agency, service improves. Assistance is most effective when groups produce a single commodity, are well-established, and are homogeneous (4) The claim that group lending reaches more borrowers with the same administrative manpower has been true in several countries, e.g., Ghana; but it has also been shown that spreading a staff too thinly and lending to many untested borrowers

can seriously affect repayment and sharply increase loan collection costs. (5) Group lending does, as claimed, reduce borrower transaction costs, since productive time lost, travel expenses, etc., are shared among group members, as in Bolivia. The authors conclude by noting that more realistic and flexible interest rates are needed to make group lending a viable innovation.

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Paper copy $1.04 Microfiche $1.08

069 **PN-AAJ-018**

WHEAT, ALLOCATIVE ERROR AND RISK: NORTHERN TUNISIA

Roe, T; Nygaard, D.
Minnesota University, Economic Development Center.
1980, 26 p.

Although often considered constraints to both greater productivity and the adoption of new technologies, the total impact of risk, uncertainty, and resource misallocation on agricultural production has yet to be empirically established. To fill this knowledge gap, this study analyzes how farmers' knowledge and perception of risk affects resource allocation in the production of ordinary and high-yield varieties (HYV's) of wheat. Two different production functions—one linking expected with actual yield and the other relating actual yield and inputs—were fitted to data gathered from 125 Northern Tunisian wheat farmers during the 1976–77 crop year. The authors then compared the two functions in order to quantify and explain errors in resource allocation and to analyze the impact of these errors on yield and land area planted in HYV's. The analysis showed that most farmers were averse to risk and were especially wary of HYV's. As a result, they were deterred from planting "riskier" HYV's and underutilized fertilizer and machinery. High risk aversion was positively related to age and the farming of valley land and was negatively related to farm size. Although farmers were quite knowledgeable of the correspondence between input use and yield, they significantly overestimated yield, especially for HYV's, because they did not anticipate less than favorable weather. In addition, not only were allocation errors greater in the production of HYV's, but, when the weather was poor, HYV's out-yielded ordinary varieties only with high input use. The report thus recommends that: (1) extension programs emphasize the relationship between yield, inputs (fertilizer, machinery), and weather and take into account farmers' resources and age as well as farm size and environment; (2) inter-variety planting be encouraged to maintain sufficient risk diversification; (3) further consideration be given to establishing crop insurance programs; (4) fertilizer and machinery services be made more readily available; (5) crop price controls be instituted; and (6) plant breeders attempt to develop new varieties which, while having a higher yield, are otherwise similar to traditional varieties. Appended are a 22-item bibliography (1974–79) and research formulae and data.

AID/DSAN-XII-G-0012 931128200

Paper copy $3.38 Microfiche $1.08

070 **PN-AAJ-035**

THE OUTLOOK FOR NATURAL RUBBER IN THE 1980's

Man, A.B.; Blandford, D.
Cornell University, Department of Agricultural Economics.
1980, 70 p.

Cornell International Agricultural Mimeograph No. 78

The rising price of oil, the main source of synthetic rubber, has given natural rubber, a key developing country export, a new economic lease on life. This paper describes the natural and synthetic rubber industries and markets and estimates a model to calculate the prospects for natural rubber. The world's natural rubber market is dominated by Asia, especially Malaysia, Indonesia, and Thailand; Africa, led by Liberia and Nigeria; and South America. Most of this natural rubber is exported to industrialized countries, particularly the United States, Japan, and China, although exports have declined in some traditional markets like Eastern Europe due to increased use of synthetic rubber. Synthetic rubber only began to be mass-produced during World War II, but accounted for 67.6% of the world's rubber market by 1975, with the United States leading the way. The dependence of natural rubber production on weather and time—it can take a rubber tree 7 years to mature—gives synthetic rubber a competitive edge, as does the synthetic rubber industry's tightly controlled and oligopolistic character. Extensive research has led to a technical superiority of synthetic over natural rubber in major end-uses in which the two are interchangeable. This superiority has kept synthetic rubber prices low and is forcing natural rubber to be increasingly price competitive. To analyze natural rubber's future prospects, an econometric model to explain production, consumption, and inventories and prices of both natural and synthetic rubber is estimated for the period 1960–1977. By 1985, natural rubber demand should increase 9–13% above 1977 levels, with the largest relative increase coming from the Japanese tire sector (although demand will decrease in other Japanese sectors). U.S. demand will basically stagnate. Production will increase in Malaysia and Thailand, but decline elsewhere. Prices of natural rubber will increase in low- and high-income growth areas by 100% and 150% respectively. These increases, combined with rising oil prices, should double the real price and hence the value of natural rubber to exporting countries by 1985. A 39-item bibliography (1939–80) is appended.

AID/ta-BMA-8 931113700

Paper copy $9.13 Microfiche $1.08

071 **PN-AAJ-038**

THE EFFECTS OF P.L. 480 WHEAT IMPORTS ON LATIN AMERICAN COUNTRIES

Hall, L.
Cornell University, Department of Agricultural Economics.
1980, 88 p.

Food aid has long been an important U.S. foreign policy tool and its popularity is likely to continue as worldwide poverty and the need to manage grain supplies in developed countries persist. However, because an increase in local grain supplies provided by food aid can depress local prices and/or lead to inadequate food production and dependence on food imports, the price and policy disincentives of food aid in recipient countries should be evaluated. This study analyzes the effects of U.S. Public Law (P.L.) 480 wheat imports on the agricultural development of Brazil, Colombia, and Peru from 1952 to 1975 and provides a basis for evaluating the effects of future food aid policy decisions. An econometric, multiequation commodity model is presented for measuring P.L. 480's effect on supply and demand for cereals, income generation, commercial grain imports, market clearing, the interrelationships of production and consumption, and government policies affecting agricultural production, consumption, and trade. Both the Brazilian and Colombian governments set commodity import prices and use the revenue generated to finance domestic support prices. The Peruvian Government, which rarely intervened in grain marketing before 1970 and has received small amounts of P.L. 480, is used as a control case against which to measure Brazil and Colombia. Analysis revealed that the effect of P.L. 480 on producer prices and on domestic production could be positive because these governments have control over commercial and P.L. 480 wheat imports and use revenues from the resale of these imports to support prices to local producers of wheat or other grains; and because of P.L. 480's role in increasing government import revenues. Specifically, wheat support prices and production were bolstered in Brazil, while in Colombia rice production benefited because rice producers possessed greater political power than did wheat farmers and because of rice's higher price elasticity. A 54-item reference list (1958–78) in English and Spanish and country data results are appended.

AID/ta-BMA-8 931113700

Paper copy $11.44 Microfiche $1.08

072 **PN-AAJ-131**

CHANGES IN COMMUNITY INSTITUTIONS AND INCOME DISTRIBUTION IN A WEST JAVA VILLAGE

Kikuchi, M.; Hafid, A.; Saleh, C.; Hartoyo, S.; Hayami, Y.
International Rice Research Institute (IRRI).
1980, 15 p.

In IRRI Research Paper Series, No. 50

Villages in Java, Indonesia have recently shown signs of a growing income disparity between rich and poor. This report analyzes the results of a household survey in Subang, a typical West Java rice village, to determine the causes of this disparity. The survey revealed a rapid decline in population growth, nonexpansion of cultivable land, an expanding labor force, and a rise in landlordism. To determine the causal links between these phenomena, the village's rice technology and harvesting systems were analyzed. It was found that the high susceptibility to insects and pests of the modern rice varieties introduced in the 1960's has led 83% of farmers to return to traditional rice varieties and that modest increases in crop yields are due not to new varieties but to fertilizer subsidies. Recent changes in the rice harvesting system dramatically evidence another finding—that manual labor has increased, but that the real wage rate has declined. The traditional bawon system of sharing harvest output widely in the community has been replaced by the ceblokan system in which participation in the harvest is limited to workers (often landless poor hired by the rich) who do extra work gratis. The ceblokan system can be considered an institutional innovation allowing employers to reduce the wage rate for harvesting to a level equal to the market wage rate in order to accomodate a more abundant labor supply. Although not all sense of moral continuity with the past was lost with the ceblokan system, e.g., widows were exempted from harrowing, the final picture of the village's economy that emerges is a dismal one: modest crop growth, labor force increases against limited land resources, declines in real wages for land preparation and harvesting—in short, a decreasing return to labor relative to land leading to a polarization in income distribution. This growing inequity, in the authors' view, is due to stagnating technology, namely, the failure to raise the relative productivity of labor by developing land-saving and labor-using technology. A 15-item bibliography (1925–80) is appended.

AID/ta-C-1466 931102600

Paper copy $1.95 Microfiche $1.08

073 **PN-AAJ-133**

ECONOMIC GROWTH, EQUITY AND AGRICULTURAL DEVELOPMENT IN THE DOMINICAN REPUBLIC

Fletcher, L.B.; Graber, E.
Iowa State University, Department of Economics.
1980, 476 p.

Agricultural sector analysis is basic in devising strategies to improve farm production and ensure equitable growth in developing countries. This study, the twelfth in a series on Latin American and Caribbean countries, analyzes the Dominican Republic's (DR) agricultural sector and suggests priorities for a national sector development program. To identify key constraints to small farm production, analysis is made of the DR's macroeconomic structure and performance and of the impact of current growth on rural incomes, employment, and standards of living; land and water resource utilization; agrarian structures, farm production, and rural income distribution; consumption patterns for foods and exports; food marketing, input supply, and credit systems; and public sector institutions and programs. Past growth in the DR has been biased toward nonagricultural urban sectors due primarily to government policies such as overvaluation of the peso and industrial investment incentives. Because priority in resource use is given to major foreign exchange earners (sugar producers) and those most able to pay resource prices (large land owners),

small and medium farmers receive inadequate water and fertilizer for high yield production. Although agrarian reform has existed since 1962, the actual latifundio-minifundio land holding structure is the major structural cause of widespread underemployment in rural areas. To achieve equitable growth for the poor (on whom the impact of past economic growth should be carefully documented), an agricultural strategy designed to increase small farm output, income, employment, and nutrition is proposed. The strategy's two key elements are: (1) introducing improved technology on existing small farms; and (2) making more land available to small farmers by creating small farms from newly irrigated and currently underused land and by redistributing land under the agrarian reform. Corollary elements of this strategy are programs in land and water resource management, input supply and food marketing, farmer organizations, public works for the poor, and training university-level agricultural professionals. Appended is a 96-item bibliography (1962–78) in English and Spanish.

AID/ta-BMA-3 931023600

Paper copy $61.88 Microfiche $5.40

074 **PN-AAJ-251**

PRODUCTION LOANS TO GROUPS OF FARMS: EXPERIMENTS IN HONDURAS

Parks, L.; Tinnermeier, R.
Oklahoma State University, Department of Agricultural Economics.
1980, 37 p.

In International Development Series, No. 80-5

Small farm credit programs, hampered by high administrative expenses, limited farmer collateral, poor loan repayment rates, and inability to reach large numbers of farmers, are trying to solve their problems by group lending. This report details the experience of the Banco Nacional de Desarrollo Agricola (BANADESA) of Honduras in extending credit to two types of groups—agricultural committees (AC), composed of independent farmers living in one town; and informal groups of small farmers organized solely to obtain loan credit. A number of potential advantages of group lending were anticipated, including lower transaction costs, improved repayment through joint liability, less required collateral through group guarantees, and assistance given to illiterate farmers from the more educated. BANADESA agreed to a trial extension of credit (not cash) to three AC's for inputs of seed, fertilizer and chemicals. After making adjustments in the first loan procedures, the bank authorized 18 additional loans to AC's. Following the AC experiment, BANADESA agreed to a trial cash loan to an informal group of farmers. Lack of group cohesion, personality conflicts between group members and bank officials, and contingencies such as a costly medical emergency combined to make loan repayment difficult. From the BANADESA experience, five conclusions are drawn: (1) The complexity of borrower group dynamics requires that much attention be given to identifying group functions and to forming groups. Groups, which ideally should consist of 10–20 members, are less stable if organized solely to obtain credit. (2) Group lending does not always reduce loan forms, requirements, collateral, etc. Some loan requirements are set by law or are deeply ingrained in the institution itself. (3) Joint liability, while essential, is not easily accepted by farmers or easily implemented by credit institutions. Farmers are reluctant to cover another's debt and good borrowers may be disqualified because their group defaulted. (4) Factors outside the group's control may cause serious group delinquency problems. (5) Farm record keeping is more readily accepted by groups receiving cash credit. It is concluded that group lending, while not a panacea for small farm development, holds promise if existing problems can be eliminated.

AID/ta-BMA-2 931113400

Paper copy $4.81 Microfiche $1.08

075 **PN-AAJ-252**

MANAGING SMALL FARMER CREDIT PROGRAMS: A CASE STUDY IN HONDURAS

Parks, L.L.; Mapp, H.P.
Oklahoma State University, Department of Agricultural Economics.
1980, 99 p.

In International Development Series, No. 80-4

The rising cost of agricultural inputs and farmers' limited funds make successful credit extension services essential to small farm ownership and operation in the developing world. This study, part of A.I.D.'s Small Farmer Credit Project, details an effort to improve the credit management and lending practices of the National Agricultural Development Bank of Honduras. The information collecting and processing component involved several activities. Loan files were investigated to determine the relation of the Bank's use of enterprise budgets to loan authorization, cash disbursement, and loan default. Farm records were analyzed for information on prices, resources, profitability, cash flow, and other variables. Next, a recordkeeping system was developed, tested, and modified in Jutiapa, Las Playitas, Ajuterique, and El Matazano. Simple, accurate crop and livestock enterprise budgets and a system for collecting input and product prices were then instituted in the 13 Bank regions. The loan administration and evaluation component involved many policy and procedural changes, such as adding fixed costs to production cost estimates and including living expenses in calculating loan repayment, only some of which were implemented. A client classification scheme was created to tailor loan processing to different clients and amounts. New, standardized forms and procedures were designed to replace the existing tedious small loan application system. Loan officer field books and activity logs with information on enterprise budgets, product and input prices, and clients were also developed. To take advantage of the lower overhead on group loans, a methodology for their administration was developed and implemented in three areas. The training component was heavily oriented to farm management and concentrated on farm finan-

cial analysis, investment analysis, and farm recordkeeping as well as on training a cadre of teachers. Although the project's narrow focus and short duration did not impede achievement of objectives, its future impact is dependent upon the Bank's strength and commitment to keeping trained people in key positions. A list of 7 English and Spanish references (1979–80) is appended.

AID/ta-BMA-2 931113400

Paper copy $12.87 Microfiche $2.16

076 **PN-AAJ-341**

ANNOTATED BIBLIOGRAPHY ON AGRICULTURAL CREDIT AND RURAL SAVINGS: PART VI

Adams, D.W.
Ohio State University, Department of Agricultural Economics and Rural Sociology.
1980, 69 p.

Providing access to agricultural credit and promoting rural savings are two essential elements of rural development strategies. To determine the effectiveness of these interventions, A.I.D.'s Office of Rural Development and Development Administration (DS/RAD) has contracted Ohio State University to prepare a series of annotated bibliographies on agricultural credit and rural savings. This document, the sixth in this series, is divided into two parts. The first section contains 157 English and Spanish titles (1962–80) concerning the growth, application, and consequences of agricultural credit; the second section presents 22 English-language titles (1966–80) pertaining to studies on rural savings. While both sections cite studies pertaining to developed countries (West Germany, Canada, South Africa, Iceland, and the United States), the majority of the studies cited pertain to developing countries in Africa (Ethiopia, Ghana, Kenya, Nigeria, and Tanzania), the Caribbean (Dominican Republic and Jamaica), East Asia (China, Indonesia, Korea, Malaysia, the Philippines, and Taiwan), South Asia (Bangladesh, India, Nepal, and Sri Lanka), South America (Bolivia, Brazil, Chile, Colombia, El Salvador, Guyana, Nicaragua, Surinam, and Venezuela), and the Near East (Pakistan). Each entry is accompanied by a synopsis to assist the reader in making appropriate selections. Author, organization, and geographical indices are appended.

AID/csd-2501

Paper copy $8.97 Microfiche $1.08

077 **PN-AAJ-477**

AN ANALYSIS OF THE VARIABLES THAT AFFECT THE ECONOMIC BEHAVIOR OF FARM-HOUSEHOLDS IN THE SOUTHERN VALLEYS AREA OF BOLIVIA

Van de Wetering, H.
Experience, Inc.
1981, 221 p.

As part of an AID-funded agricultural sector analysis in Bolivia, this report presents results of a 1977–80 socioeconomic survey of 699 representative farm households in Bolivia's southern valleys to determine the factors affecting farm household economic behavior. The survey presents descriptive information on the farm producer and his/her household (e.g., the farm; crop production, consumption, and sale; technology and crop production expenditures; livestock production; processed products; nonfarm income and expenditures; and credit) and provides a basis for establishing causal relations between rural net income and employment and the following independent variables—agricultural wage rates, relative efficiency of labor and land, size of household, rural nonfarm employment opportunities, size of area operated, prices received by farmers, and the cash outlay on off-farm produced inputs. Most important among the survey's findings are that: (1) in 1977, the average annual per capita farm household income was $92; (2) off-farm income accounts for 44% of net farm household income; (3) farm households with members employed off-farm have substantially higher incomes than farm households relying on farm income exclusively; (4) substantial mobility of labor between farms exists within the region and between Bolivia and contiguous countries; (5) time to market exerts a significant influence on net farm income yet prices received for basic food crops are not systematically related to it; (6) only 1.5% and 3% of the region's farm households receive technical training/assistance and bank credit, respectively, despite higher net farm incomes for those households that do receive training and credit; (7) cash expenditures on agricultural inputs are approximately 75% of the average farm-household's cash income; (8) yields per hectare on farms using modern inputs (fertilizer, pesticides) are not systematically higher; and (9) yields per hectare are significantly higher for farms less than I hectare. The author recommends that future studies be focused more on specific agricultural issues and that farm household livestock sectors be analyzed separately from crop sectors. A 14-item reference list (1955–80) is appended.

AID/SOD/PDC-C-0219 511048500

Paper copy $28.73 Microfiche $3.24

078 **PN-AAJ-563**

SINGLE-EQUATION ESTIMATION OF FOOD CONSUMPTION CHOICES IN RURAL SIERRA LEONE

Smith, V.E.; Strauss, J.; Schmidt, P.
Michigan State University (MSU), Department of Agricultural Economics.
1981, 123 p.

MSU Rural Development Working Paper No. 13

Predicted nutritional effects of economic policies must account for the significant role played by income and price variables in influencing food consumption of rural households. This study, based on data collected during the 1974–75 growing season from 138 households, uses a single-equation least squares

regression analysis to study the determinants of food consumption choices in semi-subsistence households in rural Sierra Leone (SL). The regressions represent the combined effects of household production and consumption decisions in response to economic and demographic variables. Two classes of regression are used: quantity equations, which estimate the quantity of food available for consumption; and share equations, which predict the share of total annual expenditure a household devotes to specific foods. Fifty-two variables are examined as determinants of food quantities available to the household—2 relate to total household expenditures; 21 are price variables; and 29 describe household characteristics such as size, age, and sex distribution. Analysis reveals that household expenditure or income levels, prices, household size and composition, regional location, and ethnic identity all affect food consumption choices of rural SL households. Whether and what a household produces for the market or for its own use affects consumption. For example, households that produce mostly for themselves consume more palm oil and groundnuts, while households producing for market eat less cassava, sorghum, and other cereals. No such relationship is noted for rice. However, regional and ethnic groupings do reveal significant differences in rice consumption. Positive expenditure elasticities are noted for rice, palm oil, fish, vegetables, and alcoholic beverages; for rice and palm oil, these elasticities generally fall as expenditure levels rise. While food preferences, climate, and soil are major consumption determinants, households also adapt their consumption practices to crop sale and food purchase prices. For example, households, especially those with low incomes, compensate for high rice prices by reducing their consumption of several other foods. An 11-item bibliography (1974–80) and a list of 31 MSU rural development papers are appended.

AID/DSAN-C-0008 931131500

Paper copy $15.99 Microfiche $2.16

079 **PN-AAJ-700**

DUALISM, TECHNICAL CHANGE, AND RURAL FINANCIAL MARKETS IN DEVELOPING COUNTRIES

Iqbal, F.
Rand Corporation.
1981, 40 p.

Research to date on rural financial markets (RFM) in developing countries has failed to explain the relationship between the growing dualism of RFM's into formal (banks, cooperatives) and informal (private moneylenders) credit sources and farmers' acceptance or rejection of new farm technology. This report, based on a 1968–71 survey of 3,000 Indian farmers, examines this relationship and its implications for Indian policymakers. An overview of India's current rural credit situation reveals the growing importance of both formal credit sources and of technological change in the demand and supply of credit and the tendency for less-progressive farmers to seek credit from informal moneylenders. The determinants of informal credit interest rates are then analyzed with the help of an empirical model based on the opportunity costs of providing a loan, the administrative costs of handling a loan, and the risk factor assigned to various types of borrowers. Analysis indicates that informal credit interest rates, especially for consumption loans, which constitute 85% of all informal loans, are reduced to the extent that farmers possess more land, adopt new technology and so have greater yields, and are educated, thus posing less of a credit risk. This view contrasts sharply with the view that presupposes a greater risk factor in the new technology to explain why farmers are reluctant to adopt it. Analysis indicates further that the presence in a village of a formal credit source which provides—according to government regulation—low interest rates, reduces the informal interest rate 2.7%–3.6%. This finding confirms the hypothesis that the presence of such formal sources forces informal sources which formerly monopolized the village credit market to become competitive by reducing their "monopoly surcharge". Although this competition is healthy, government interest-rate policies appear to be overcompensating for the "monopoly surcharge" which is, in fact, comparatively low. Finally, policymakers are invited to adopt the study's main finding—that credit interest rates are lowered to the extent that technical change is adopted. Appendices include a 29-item bibliography (1957–80).

AID/otr-G-1822 930008800

Paper copy $5.20 Microfiche $1.08

080 **PN-AAJ-877**

AN ANALYSIS OF FACTORS AFFECTING THE ADOPTION OF MODERN VARIETIES IN EASTERN NEPAL

Rawal, T.
Agricultural Development Council, Inc.
1981, 18 p.

In Research Paper Series, No. 11

Due to land constraints, Nepal requires yield-increasing technology to maintain food self-sufficiency. Although rice is Nepal's main farm income crop, yield per hectare is less than 2 tons due to the lack of modern seed varieties (MV's), fertilizer technology, and controlled irrigation. This paper analyzes variability in the adoption of rice and wheat MV's and in the use of chemical fertilizer in Nepal's Morang and Sunsari provinces. Data were collected and analyzed with the help of multiple linear regressions. Rice MV's were found to have a 30% higher yield than local varieties (LV's); a comparison of wheat varieties was impossible as wheat LV's are no longer grown. The factors identified as influencing MV rice adoption include farm size; proportion of low land to total land; proportion of farm irrigated; size of available family labor force; operator's education; contact with extension agents; number of years since MV rice was first used; and the farmers use of institutional credit. These same factors, especially irrigation, influenced the adoption of

MV wheat. Possible explanations for the slow adoption of MV rice are the existence of established markets for LV rice and the difficulty of drying high-moisture MV rice during monsoon periods. Furthermore, the main MV rice variety grown in Nepal is IR8, considered less palatable and more susceptible to insects than LV's. Labor requirements are similar for LV and MV rice production, but hired labor, as distinct from family labor, is used to a greater extent with MV's. Variability factors on the use of chemical fertilizers include cost, experience use, area planted with MV's, farm size, and credit. Research is needed to replace IR8, while investment in irrigation, education, and extension programs could expand the type of environment in which MV's are best adopted. Five illustrative tables and a 13-item reference list (1954–79) is included.

AID/asia-G-1199 367025100

Paper copy $2.34 Microfiche $1.08

081 **PN-AAJ-878**

THE IMPACT OF MODERN VARIETIES OF RICE ON FARM INCOME AND INCOME DISTRIBUTION IN EASTERN NEPAL

Karki, B.B.
Agricultural Development Council, Inc.
1981, 20 p.

In Research Paper Series, No. 12

Despite general agreement that modern rice varieties (MRV's) are higher yielding than traditional rice varieties (TRV's), researchers differ sharply on whether adoption of MRV's favors large over small farmers and capital over labor. To help resolve these issues, a survey, results of which are here presented, was conducted of 180 farmers in Eastern Nepal to identify the relationship between farm size and the adoption of MRV's and to estimate the costs and benefits of MRV and TRV technologies. A Chi square test indicated that larger farmers did not adopt MRV's to a significantly greater degree than did small farmers. A study of cost components showed that although expenditures for MRV's were 56% higher than for TRV's due to needed inputs such as irrigation pumpsets and fertilizer, MRV's had a 42% higher yield, resulting in a 22% increase in net income per hectare. A higher proportion of hired labor is used in MRV production (78% compared to TRV's 56%) and is accompanied by an absolute decline in total family labor. To determine whether MRV benefits have been distributed equitably—a key aim of the Government of Nepal's agricultural development policy—the elasticity of substitution between capital and labor was measured through a constant elasticity of substitution production function for both MRV and TRV technologies. It was found that the elasticity of substitution did not differ significantly, indicating that MRV technology is neither labor- nor capital-biased compared to TRV technology. Thus, the goals of increased agricultural production and equitable distribution seem to be attainable. Researchers argue, however, that mechanization and MRV adoption could polarize rural communities into large commercial farmers and landless peasants. To date, tenants are not adopting MRV's to the same degree as owner-operators, because tenants, while having to bear the full increased cost of MRV's, are forced to share increased production with the land-owner. Effective implementation of Nepal's Land Reform Act and caution regarding mechanization could help popularize MRV's while helping to reduce income disparities. A 16-item reference list (1961–79) and 7 illustrative tables are included.

AID/asia-G-1199 367025100

Paper copy $2.60 Microfiche $1.08

082 **PN-AAJ-879**

RICE PRODUCTION IN THE TARAI OF KOSI ZONE, NEPAL

Karki, B.B.; Rawal, T.; Flinn, J.C.
Agricultural Development Council, Inc.
1981, 28 p.

In Research Paper Series, No. 13

To determine the comparative profitability of the adoption of modern rice varieties (MV's) in Nepal for owner-operators, tenant farmers, and hired labourers, this paper analyzes the impact of MV's on the income and employment of these three groups in the Kosi zone of Nepal, a major rice-exporting area and target zone for Nepal's land reform and MV extension services. MV's, particularly IR8, are grown on 25% of the Kosi rice land, predominantly by owner-operators on the basis—as indicated by a standardized discriminant function—of tenure, farmer's education, and access to irrigation and production credit. Tenants are obliged to share over 44% of their crops with the landlord, but failure to enforce the rent system and land reform laws makes owners' gross margins even higher. Until tenants are able to pay a fixed rent or are allowed cost-sharing arrangements, it will be unprofitable for them to grow MV's. While not directly benefiting from MV's, as owners do, tenants and landless labourers do possess increased employment opportunities due to the need for high labour inputs in MV crop management, irrigation, harvesting, and threshing. Since MV's mature in the wet season, and not in the dry, as do local varieties (LV's), additional labour is required for timely harvesting to prevent crop spoilage and loss. As compared with yields for LV's, which are generally rainfed (1.8 tons/ha), MV's produce higher yields both when rainfed (2.1 t/ha) and when irrigated (2.8 t/ha). A budgetary analysis divides total production costs into labour (40–50%), seed accounts (10–14%), bullock power (16–24%), and fertilizer (up to 25% for irrigated MV's). This analysis concludes that although the benefit-cost ratio is higher for irrigated MV's than for LV's, the MV's lower unit value of grain and straw and higher input costs make rainfed MV's less cost-effective than LV's. Experiments with irrigated MV's have produced yields of over 3 t/ha, indicating that limitations on MV production (e.g., climate, availability of fertilizer, unsuitability of local soils) can be overcome to further increase yields. A 34-item list of references (1952–80) is appended.

AID/asia-G-1199 367025100

Paper copy $3.64 Microfiche $1.08

083 PN-AAJ-926

CAPTURING THE ECONOMIC SURPLUS CREATED BY IRRIGATION

Easter, W.K.
Minnesota University, Department of Agriculture and Applied Economics.
1980, 25 p.

In Staff Paper Series, No. P80-14

Irrigation projects, once economic assets to developing countries, are now financial burdens that draw on general revenues to pay rising construction, maintenance, and operating costs. This report concludes that irrigation projects should net an economic surplus as long as planners use a price-flexible design responsive to regional irrigation needs and governmental revenue requirements. The report first describes the two goals of irrigation pricing policy, namely, to recover operating costs and to control water allocation. Next, the six types of water charges are examined. Volumetric charges are suited to countries where water is scarce and allocation must be efficient. Water share pricing is used in areas where it is more efficient to charge for the number of irrigations or the amount of time water flows into irrigated plots. Charging a fixed rate per acre is recommended for areas with large water resources because it has no effect on water use efficiency. Levying a tax on the output of irrigated land makes fee collection easier but also has no effect on water use efficiency. A developmental fee is applied to areas where greater irrigation use over time is desired; here, low fees will be raised incrementally as more farmers increase the output of the irrigated region. Finally, taxes may be levied on all lands in the irrigated area under the assumption that irrigation expands the entire region's economy and that everyone benefitting should contribute to covering costs. Factors affecting irrigation pricing policy, treated next, include water value, demand elasiticity, dependability of supply, ability to contain water return flows, irrigation system capacity, traditions of ownership and water law, training, desires to subsidize agriculture, and indigenous experience with irrigation. Finally, five alternative criteria for setting irrigation fees are presented: meeting target revenues; benefit pricing to recover the economic surplus generated; taxing net returns; and recovering total cost or marginal costs. Incorporating price flexibility into project design is recommended to permit control of water allocation and to allow fee revisions over time. A 23-item list of references (1960–80) is appended.

AID/ne-C-1507 298003500

Paper copy $3.25 Microfiche $1.08

084 PN-AAJ-916

THE POLITICAL ECONOMY OF BOLIVIAN AGRICULTURAL CREDIT

Ladman, J.R.; Tinnermeir, R.L.
Ohio State University, Department of Agriculture.
1979, 30 p.

Although developing country governments ostensibly provide agricultural credit for purely economic purposes, they also do so for political reasons that may influence economic performance. To substantiate this view, this paper explains the structure of developing country credit programs and presents supporting evidence from Bolivia. Developing country governments typically control formal credit by creating public agricultural development banks or by establishing private credit portfolio requirements. Money is lent to farmers at concessionary terms to compensate for structural injustices, such as low crop prices, inherent agricultural risks, and the paucity of rural infrastructure. Repayment schedules are often lax, allowing long-term delinquency and default. This policy results in substantial transfers of income from taxpayers and savers to rural borrowers, thus giving government officials significant political leverage over agricultural land holders and credit seekers. Unfortunately, misuse of credit distribution also gives rise to resource misallocation, government corruption, and diversion of credit from agricultural to nonagricultural uses. During the period 1966–75 in Bolivia, evidence suggests that the government manipulated agricultural credit to favor large farm owners in the politically and economically eminent region of the Oriente (eastern lowlands). Of Bolivia's Agricultural Bank's (BAB) credit, 76% was directed to cotton, sugar, and rice farmers in the eastern Department of Santa Cruz, and of those loans, 50% were delinquent, and more than one-third had been refinanced, indicating credit diversion. Virtually no credit was directed to the numerous peasants in the Altiplano (highlands). Although calculations are lacking, it is suspected that this policy has worsened personal and interregional income distribution within the country and that overall economic development has suffered. While the economic merits of scrapping concessionary financing are clear, the political consequences will dictate against it.

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Paper copy $3.90 Microfiche $1.08

085 **PN-AAJ-019**

PRELIMINARY GUIDE TO AUDIOVISUAL MATERIALS ON ENVIRONMENTAL AND NATURAL RESOURCE ISSUES IN DEVELOPING COUNTRIES

Natural Resources Defense Council.
1980, 43 p.

A Survey for the U.S. Agency for International Development's Man and the Biosphere Program

A.I.D.'s focus upon environmental problems is still relatively new, and there remains a need to increase understanding among A.I.D. personnel and their host country counterparts of the importance of maintaining environmental quality and a sound resource base. Audiovisual materials can play an important role in this task. This guide, compiled by the Natural Resources Defense Council, includes references to 84 audiovisual materials suitable for use in programs which address the relationship between the environment and natural resources and development. In compiling this guide, requests for information about such materials were sent to over 100 government agencies, academic institutions, environmental organizations, and commercial film distributors in the United States and abroad. The items listed in the guide were chosen on the basis of whether they discussed and/or illustrated: (1) the effects of economic development upon the human environment; (2) the impacts of natural resource degradation upon human well-being; or (3) an approach to the protection and management of natural resources. Consideration was also given to whether the material considered such issues in a developing country setting or in a context relevant to A.I.D. and developing country concerns. The guide does not include recommendations on the quality or usefulness of any of the items, but does provide the following information for each entry: the title of the material; name of producer; date of production; a description of the content; format (16 or 35 mm film, slides, videotape, or cassette); length in minutes; color or black and white; language (most are in English, but a few are available in Spanish, Japanese, or French); name and address of distributor; purchase and rental prices; and loan availability. Subject and geographic indices and a list of 21 sources of information and materials are appended.

Paper copy $5.59 Microfiche $1.08

086 **PN-AAJ-317**

DEVELOPMENT ASSISTANCE IN FORESTRY: AN A.I.D. POLICY BACKGROUND PAPER

Simmons, E.
A.I.D.; Forest Resources Group.
1980, 53 p.

A.I.D. has both the mandate and the experience to help developing countries address the serious global environment problem of deforestation. This A.I.D. policy background paper identifies current forestry issues, describes A.I.D. forestry-related experiences, and sketches an A.I.D. forestry strategy for the 1980's. Most forestry problems occur when ecosystem use is changed in non-sustainable ways, i.e., ways which render forests continuously unproductive. Rapid population growth rates and inadequate technologies give rise in developing countries to four unsustainable forest use patterns: excessive fuelwood collection; shifting cultivation; replacement of forest lands with pasture and forage production; and unrestrained timber harvesting. In addressing these problems, past A.I.D. projects have concentrated on analysis, planning, and policy formulation including natural resource inventories and land use assessments, land capability classification, and evaluation of tenure law and its applications; institution-building for natural resource management and conservation, including training and establishing management and service support systems; incorporating forestry activities into agricultural and rural development programs; reforestation and protection of natural and induced vegetation; and developing alternative energy strategies. The author recommends that future A.I.D. forestry projects aim at: (1) raising the level of developing country awareness of the forestry problem; (2) supporting direct forestry development initiatives such as identifying critical catchment areas and training local people for local forestry projects; (3) reducing the causes of deforestation by developing renewable and alternative energy sources and appropriate and sustainable cropping systems; (4) increasing efficiency in the use of forestry and other natural resources by technological improvements and controlling resource use rates; and (5) improving institutional capabilities for forestry and natural resource management. Implementing this stratgey will require a careful identification of priority activities by USAID's, accomodation to the longer time span required for forestry development, and marshalling the necessary funds, technology, and personnel.

Paper copy $6.89 Microfiche $1.08

087 **PN-AAJ-322**

ENVIRONMENTAL DESIGN CONSIDERATIONS FOR RURAL DEVELOPMENT PROJECTS

Harza Engineering Company.
1980, 189 p.

The success of rural development projects largely depends on the appropriateness of project design to the target area's natural and social environment. This manual, intended for use by A.I.D. field officers, development consultants, and host-country planners, presents guidelines for identifying potentially desirable and undesirable environmental effects that may accompany small rural projects (with some attention given to situations in larger villages and periurban areas) and applies these guidelines to specific types of rural projects. Rural communities are generally small and self-sufficient, making it especially important to consider, at the design stage, a project's impact on all members of the community and the need to remove obstacles so that villagers can advance themselves without becoming unduly dependent on others. Environmental effects may be expected in several areas including human

ecology, health, air and water quality, pesticide contamination, and endangered species. Consideration of indirect effects is important, including the effects on groups other than the intended beneficiaries. Projects should be treated in an integrated regional or national context since individual projects may compete for resources or may supplement each other. Interagency coordination may also be needed. Steps in environmental planning include project definition, understanding of area characteristics (baseline conditions), analysis of potential impacts, and planning to mitigate adverse impacts and enhance benefits. Five specific types of rural projects are discussed in detail: roads, electrification, water supply and sanitation, irrigation and on-farm water management, and small-scale industry. Project description, environmental considerations, mitigation and enhancement measures, operational evaluation and monitoring, and planning information required are discussed for each project type. Appendices discuss human ecology, environmental health, and water quality. Ninety-five references (1954–80) are listed in four bibliographies.

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Paper copy $24.57 Microfiche $2.16

088 **PN-AAJ-431**

THE ECONOMICS OF VILLAGE-LEVEL FORESTRY: A METHODOLOGICAL FRAMEWORK; FINAL REPORT

Shaikh, A.M.; Larson, P.S.
1981, 77 p.

Many of the small-scale, decentralized energy projects intended to meet the developing world's deepening deforestation crisis lack a thorough economic analysis at the design stage and consequently are economically unsound. This report enunciates an economic methodological framework for energy project formulation and development, broadening the traditional tools of cost/benefit analysis to fit the complexities of village-level forestry programs (VLFP). The author accordingly considers the project's investment and benefit levels, distribution of incentives and decision-making, allocation of burdens and outputs, property rights/land tenure relationships, and specific resource scarcities; especially as pertaining to individual evaluations of the risk of project participation. To be economically sound, a VLFP must be financially attractive to investors (on local, private, and governmental levels) and to society as a whole, and be efficient, that is, replicable within reasonable time, financial, and institutional constraints. Government subsidies should at least equal a VLFP's societal benefits and should also be proportional to the project's overall contribution to national objectives and to long-term budgetary resources. When quantified in economic terms, these ratios can provide an approximate figure adequate to assess a given project design's budgetary implications. VLFP's are to be economically evaluated on both investor and social levels in terms of initial/recurrent inputs and direct/ indirect outputs. Values of all items are identical on both levels except the input of peak-season labor and the indirect output of environmental and soil fertility benefits. After summarizing the information needs for estimating the input/output valuation, the author applies the analytical model to two projects in Mali's Mopti region to create a community woodlot and to plant trees on individual farmlands. A comparison between the two efforts indicates that woodlots require high commercial output and are less attractive from the investor, social, and project efficiency viewpoints. Appended to the report is a 60-item (1975–81) bibliography in French and English.

AFR/0929-C-00-1007-00 625092900

Paper copy $10.01 Microfiche $1.08

089 **PN-AAJ-889**

WORKSHOP ON ECOLOGY AND ENVIRONMENTAL PROGRAMS IN THE SAHEL, BAMAKO, MALI, JANUARY 22-26, 1980; STAFF SUMMARY REPORT

National Academy of Sciences, National Research Council, Board on Science and Technology for International Development, Advisory Committee on the Sahel.
1980, 60 p.

The accelerating degradation of the Sahel's ecosystem urgently requires research on controlling desertification. This report reviews a workshop held to address this need at which the National Academy of Sciences assisted the Sahel Institute (INSAH) of the Inter-State Committee for Combating Drought in the Sahel (CILSS) to prepare its First Quinquennial Research Program (1981–85). The workshop assigned highest priority to three research themes from the CILSS's Plan to Combat Desertification: (1) evaluation of the impact of development activities and policies on the Sahelian ecosystem; (2) assessment of the Sahel's natural resources and their evolutionary tendencies; and (3) investigation of genetic improvement as a means to diversify, restore, and rationally manage vegetation. In each of these Program areas workshop participants called for both fundamental and applied research, improvement of research methods and techniques, evaluation of policies, collection of scientific and technical information, dissemination of research results, and integration of training into research efforts. Above all, the participants declared that the Program must be compatible with ongoing national and regional projects. The Program will be conducted by a team consisting of an ecologist, a natural resource planner, and a forest manager who will briefly tour each CILSS country. NAS proposed, subject to final agreement and adequate manpower and funding, in part from A.I.D., cooperation with INSAH in further defining the Program; strengthening regional networks, possibly in cooperation with other donors; and designing and evaluating projects. In conclusion, it was noted that planners in the Sahel must more aggressively introduce and test arid zone food and cash crops; focus on collecting indigenous, adapted species; undertake revegetation around well-points in cooperation with pastoralists; promote greater stability in agriculture in marginal areas; seek local participation; emphasize the northern zones of the Sahel; and heed local social and environmen-

tal adaptations. Appendices include a list of the workshop's participants and French-language copy of the Plan to Combat Desertification.

AID/afr-C-1354 625000995

Paper copy $7.80 Microfiche $1.08

090 PN-AAJ-395

DRAFT ENVIRONMENTAL REPORT OF HONDURAS

Silliman, J.R.; Hazelwood, P.
Arizona University, Office of Arid Land Studies.
1981, 117 p.

Sponsored by A.I.D. through the U.S. National Committee for Man and the Biosphere

Honduras suffers major environmental problems which, due to the increasing exploitation of marginal lands by a rapidly expanding population and the implementation of more ambitious natural resource exploitation programs, are currently reaching crisis proportions. So concludes this AID-funded draft report on the country's environment and natural resources. Against background descriptions of the Honduran geography, climate, population, and land use, the study outlines the country's environmental resources (geologic and soil, water, and flora and fauna) and current conservation measures and details major problem areas. The country's main environmental problem is soil erosion and loss of soil fertility due to uncontrolled agricultural settlement and the widespread use of traditional slash and burn cultivation systems by small farmers migrating to increasingly marginal and sloping lands. In addition, alluvial and valley soils best suited to intensive cultivation are frequently used for less productive and less labor-intensive pastureland. If forest resource depletion—caused by major lumber and pulp cutting projects, increased use of timber among rural populations for fuel, and accelerated clearings for agricultural development—continues at its current (1980) annual rate of 60,000 ha, forest resources will be completely exhausted by the year 2000. Other environmental problems are the unintentional results of rural and urban development. Although not widespread in Honduras, problems associated with the indiscriminate use of agricultural pesticides such as human and animal poisoning and malaria, have been discovered in neighboring countries. Surface water contamination leading to contagion of disease through drinking water plagues Tegucigalpa and threatens other urban and semi-urban areas having inadequate sewage and water treatment systems. To help preserve remaining resources, the authors recommend establishing a national policy to manage and control land use; reserving land tracts for prioritized land uses; and enforcing current environmental law. Appendices include a summary of Honduran environmental law and policy and a 111-item bibliography (1927–80) in English and Spanish.

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Paper copy $15.21 Microfiche $2.16

091 PN-AAJ-396

DRAFT ENVIRONMENTAL PROFILE ON THE GAMBIA

Silliman, J.R.
Arizona University, Office of Arid Land Studies.
1981, 90 p.

Sponsored by A.I.D. through the U.S. National Committee for Man and the Biosphere

Agrarian-based economies that rely on single commodity production are particularly vulnerable to environmental mishaps and natural disasters. This study, a preliminary review of information available in the United States, profiles The Gambian environment to assist USAID and host country officials in preventing such calamities and in using natural resources for advantageous and environmentally-sound purposes. The Gambia's geography, climate, population, and land use patterns are described, its environmental resources assessed, and its current and potential environmental problems exposed. The Gambia is a small, densely populated West African nation with an agrarian economy based on the rain-fed cultivation of groundnuts. Its dominant geographic feature is the Gambia River, a tidal estuary flanked with tall mangrove forests in the western half of the country. Saline waters extend far upstream during the dry season, preventing the use of river water for irrigation. The Organization for the Development of the Gambia River Basin plans to construct a salinity barrage to increase rice production by irrigating double-cropped rice, but more census information is needed to assess the environmental effects of the barrage, as well as of a proposed dredging project between Banjul and Kau-ur and between Kau-ur and Fatoto. The Gambia's major environmental problems are caused by increased pressure on the country's limited land from growing human and livestock populations and include a shortage of fuelwood due to increased clearing of forests for cultivation, cutting for fuelwood, and a lack of well-managed forest plantations; and soil degradation and loss of natural diversity. Water-borne diseases such as malaria and intestinal parasites are also posing major health problems. The author concludes that although lacking in trained staff to implement environmental programs, the governing authorities are environmentally enlightened and The Gambia is sufficiently small and homogeneous that its environmental problems are manageable. Appendices include a 134-item bibliography (1892–1980), an overview of Gambian environmental policy, agencies, and law; and a list of current donor-funded environmental programs.

SA/TOA-01-77 931015900

Paper copy $11.70 Microfiche $1.08

092 PN-AAJ-625

DRAFT ENVIRONMENTAL PROFILE ON SYRIA

Library of Congress, Science and Technology Division
1981, 89 p.

Sponsored by A.I.D. through the U.S. National Committee for Man and the Biosphere

Despite a steadily rising standard of living, Syria, according to this draft environmental report, faces increasingly ominous problems in regard to its water, soil, and forest resources. Water pollution is Syria's most important water-related problem. A lack of sanitary sewerage disposal systems and the increased dumping of industrial wastes have caused significant ecosystem damage to the Euphrates, Oronte, and Barrada river basins. Unfortunately, little progress has been made in eliminating water pollution since 1972 when the U.N. Conference on the Human Environment named it one of Syria's worst environmental problems. Syria's semi-arid climate forces it to use 94% of its water for irrigation. This has led to overpumping followed by drought conditions in some areas and saltwater intrusion in the coastal plains. Syria's climate also threatens its soil resources. Only 31% of the land is cultivable, and although Syria has reclaimed some of the vast eastern desert, salinity and waterlogging are an ever-present scourge in the battle against desertification. Underscoring the desertification threat is Syria's loss of surface vegetation through deforestation. Today, forests cover only 2.4% of Syria's surface area. Strenuous efforts have been made to preserve these forests by restricting animal grazing on saplings, checking erosion, reforesting the land (60,000 hectares as of 1978), and intensively growing poplars. Poplars, because of their fast growth compared to average Syrian forest vegetation, have increased the availability of wood products without seriously impinging on the forest conservation program. Air pollution from car, factory, and refinery exhausts is also a problem in Syria's major cities (Damascus, Homs, and Aleppo), but is not yet as serious as the threat of pollution to water and soil. Syrian wildlife resources appear to be scanty. Although the wolf, the Anatolian leopard, the Syrian wild ass, and the Saudi Arabian dorcas gazelle are listed as endangered species, little information on these or any other species could be found. Basic social and economic data are provided, as are information on Syrian environmental legislation, a list of Syrian environmental and natural resource organizations, and a 44-item bibliography (1967–80).

SA/TOA-01-77 931111300

Paper copy $11.57 Microfiche $1.08

093 **PN-AAJ-626**

DRAFT ENVIRONMENTAL PROFILE ON UNITED REPUBLIC OF CAMEROON

Arizona University, Office of Arid Land Studies.
1981, 84 p.

Sponsored by A.I.D. through the U.S. National Committee for Man and the Biosphere

As part of an A.I.D./U.S. Man and the Biosphere Program effort to assist developing countries in environmental planning, this report provides a preliminary profile of Cameroon's environment and natural resources. The report begins by profiling the great natural diversity of Cameroon's four major geographic regions—the Western and Coastal Lowlands, the Southern and Central Plateaus, the Western Highlands, and the Northern Plains. The marked south-north gradation of both climate and vegetation (tropical rain forest to semi-desert regions) is analyzed with the help of maps and charts. The body of the report reviews Cameroon's socioeconomic characteristics, environmental resources, soil types, water resources, fauna, national parks, and vegetation. Cameroon's main environmental problems are forest destruction, range degradation, and waterborne diseases. Most of Cameroon's forest resources may already be destroyed, and this destruction is endangering wildlife. Although a number of forestry reserves have been set aside, logging concessions and uncontrolled poaching within their boundaries have made them ineffective. Development of a national forest policy, based on an assessment of the extent of deforestation, is a top priority, as is protection of the montane forests in the heavily populated western highlands. The range in the northern semi-arid region has been severely degraded by drought, the overcrowding of stock animals, and extensive underutilization due to tsetse fly infestation. A pilot range management program in the Chari Delta and on the Diamare Plain is recommended, along with trypanosomiasis research on cattle, range seeding projects, and the rotation of livestock water supplies. Schistosomiasis, trypanosomiasis, intestinal parasites, and especially malaria (90% of adults infected) are Cameroon's greatest waterborne diseases, but neither control of malaria (carried by the Anopheles mosquito) or trypanosomiasis (carried by tsetse flies) nor significant improvement in rural water supplies appears likely in the near future. Appendices include a 40-item reference list (1944–80), a 59-item bibliography (1942–75), and a list of host country environmental organizations.

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094 **PN-AAJ-805**

DRAFT ENVIRONMENTAL PROFILE ON GUATEMALA; PHASE II

Cooley, J.L.; Farnworth, E.G.; Hoy, D.R.; Jordan, C.F.
Georgia University, Institute of Ecology.
1981, 88 p.

Sponsored by A.I.D. through the U.S. National Committee for Man and the Biosphere

Guatemala's expanding population and the resulting demand for wood, cultivable land, and sewage disposal facilities has greatly strained the nation's natural resources. Watershed deforestation, especially on the steep slopes of the Central and Western Highlands, has caused severe soil erosion; animal populations are declining, with many species near extinction; sedimentation from deforested watersheds and sewage dumped directly into rivers and streams has degraded water quality in rural and urban areas, respectively; and pesticide-related human health problems are extensive in the country's cotton growing areas. Besides outlining these major environmental problems, this draft report profiles Guatemala's natural resources, outlines existing environmental policies and institu-

tions and constraints to their effectiveness, and offers short- and long-term recommendations for arresting environmental damage. Suggested short-term responses include implementing a model integrated watershed-village management project; conducting an experimental comparison between till and no-till agriculture; establishing an agricultural/ecological experiment station in the Peten to develop innovative agricultural management systems; setting up at least one forest ecology experiment station; instituting cooperative efforts between conservationists and planners to preserve economically important species in the Transversal lowland rain forest; expanding the Guatemalan "biotope" in the Atlantic montane rain forest to assure preservation of the Quetzal, the national bird; conducting economic analyses of the market and non-market benefits and costs of sewage treatment and of the non-market costs of deteriorating air quality in Guatemala City; and instituting a demonstration project to divert sewage into settling ponds and use the treated sewage and water for agricultural land enhancement. Two long-term recommendations are also suggested: establishing a national institute responsible for environmental policy, research, management, education/extension, and enforcement; and developing economic strategies to replace subsistence agriculture and thus alleviate environmental hazards (e.g., deforestation, soil depletion) associated with it. A list of 18 references (1970–81) and a 50-item Spanish and English bibliography (1950–81) is appended.

SA/TOA-01-77 931111300

Paper copy $11.44 Microfiche $1.08

A nursery worker in northern Pakistan sorts seedlings in preparation for planting. Small tree nurseries such as this are scattered throughout Pakistan.

095 **PN-AAJ-806**

DRAFT ENVIRONMENTAL PROFILE OF THE ISLAMIC REPUBLIC OF PAKISTAN

Varady, R.G.
University of Arizona, Office of Arid Lands Studies, Arid Lands Information Center.
1981, 235 p.

Sponsored by A.I.D. through the U.S. National Committee for Man and the Biosphere

The Islamic Republic of Pakistan faces a population rapidly approaching 100 million, a deteriorating environment, and depleted natural resources in its efforts to improve the standard of living of its people. This report reviews information available in the United States on the status of Pakistan's environment and natural resources. The report's initial section provides a general overview of Pakistan's geography and climate, population characteristics, and land use practices. Section two details the country's mineral, energy, soil, water, and vegetation resources. Specific government agencies, as well as pertinent legislation and policy, are outlined for each resource. Four environmental problem areas are identified. (1) Water-related problems, the most serious being waterlogging, salinity, and sedimentation have been caused by poor drainage of irrigated land, unlined canals, and the proliferation of canals, dams, and barrages. Flooding, drought, and water/ marine pollution are additional concerns. (2) Rural environmental problems include natural disasters, underuse and misuse of lands, and excessive pesticide use, but deforestation and desertification caused by conversion of land to agriculture are of most concern. These result in gully and topsoil erosion, increased flooding, destruction of faunal habitats, elimination of natural predators of pests, and eventual abandonment of the land. In addition, overgrazing is rapidly reducing the potential of Pakistan's vast rangelands. (3) Urban environmental problems include increased industrial and noise pollution, but the greatest concern is for the dramatic increase in malaria after a period of apparent control in the late 1960's. Mosquitoes are becoming more resistant to insecticides and their breeding places are increased by irrigation projects. (4) Environmental management problems include interagency rivalry, inefficiency, manpower shortages, and communication problems among government environmental agencies. Public apathy also interferes with effective control Appendices include overviews of Pakistan's demography, economy, and environmental legislation, and a 104-item bibliography (1966–80).

SA/TOA-01-77 931111300

Paper copy $30.55 Microfiche $3.24

096 **PN-AAJ-100**

REPORT OF STRATEGY ADVISORY GROUP ON ANTI-MALARIA SUPPORT STRATEGY FOR TROPICAL AFRICA

Dalmat, H.T.; Eason, J.C.; Farwell, A.E.
American Public Health Association (APHA).
1980, 176 p.

Malaria is the greatest threat to life and socioeconomic development in tropical Africa. Given a problem of such magnitude, A.I.D. convened a Strategy Advisory Group to determine if donor assistance can avert or at least blunt malaria's devastating impact in the area. This report summarizes the Group's findings, identifies achievable malaria control goals, techniques and approaches to reach those goals, the steps which African countries must take, and the response required of donors. Since the eradication of malaria is currently unfeasible in all but the coastal islands of Africa, a more limited goal must be adopted, namely, of "controlling" or reducing the prevalence of malaria so that it is no longer a major public health problem in tropical Africa. The report lists 18 constraints to this goal while highlighting four of them: inadequate training facilities, limited resources, inflation, and inadequate assignment of priority to malaria problems. Malaria control techniques and strategies in rural and urban-periurban areas and for atypical situations (by reason of geographical area or a program not directly related to malaria) are restricted to the parameters set by these constraints. Priority is given to curative (versus preventive) administration of an effective drug to all suspected cases of malaria and extension of malaria chemoprophylaxis to the most vulnerable groups—children under five and pregnant women. While techniques vary in different situations, general strategy requirements remain constant: (1) an organizational structure; (2) advance planning on all levels; (3) coordination of in-country activities; (4) training on all levels; (5) applied and developmental research, with emphasis on developing new anti-malarial drugs; (6) small-scale projects; and (7) ongoing evaluation. Donor support for these seven areas is recommended. Similarly, donors are unwilling to assist without evidence of a long-term national commitment to a goal-oriented, well-planned, and technically feasible anti-malaria program. The study concludes by stressing the importance of cooperation among African countries and among donors. A.I.D.'s questions to the Strategy Advisory Group are appended.

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Paper copy $22.88 Microfiche $2.16

097 **PN-AAJ-112**

STRATEGY AND GUIDELINES FOR IMPROVEMENTS IN SANITATION AND WATER SUPPLY IN SELECTED AREAS OF THAILAND

Pineo, C.; Barokas, R.; Batavia, M.
American Public Health Association (APHA)
1980, 135 p.

In an effort to expand its rural water supply and sanitation (RWSS) program in Thailand, A.I.D. contracted APHA to assess the impact of past A.I.D. RWSS projects in the country and to develop a strategy and options for further A.I.D. RWSS projects. Focusing their attention on the poorest of the rural poor, the APHA team, whose findings are here presented, visited 40 villages with an average population of 753 and representing 0.42% of 10 of the 20 provinces in which A.I.D. is participating in the Accelerated Primary Health Care (PHC) Project. Factors favoring implementation of an RWSS program in villages of less than 1,000 included the existence of the Ministry of Public Health (MPH) and its RWS/S Divisions, with their experience and their structure targeted to the local level; the success of past and present A.I.D./MPH programs, especially the ongoing PHC program; the existence of national RWSS targets; and the pressing need and desire of villagers for improved RWSS facilities. Constraints to an RWSS program are a lack of: trained personnel (including supervisory personnel) and transportation; adequate maintenance even for simple hand pumps; an adequate data base (including data on villagers' preferences regarding potable water sources); and a coordinated plan and funding. The following strategic actions were suggested: (1) assist in a detailed study of RWSS in all 20 provinces in the PHC program and develop an RWSS component for the project, arranging for four expatriates and 20 Peace Corps Volunteers to help develop and implement the component; (2) develop an MPH/USAID/T public health program and an RWSS project that can be implemented by MPH's RWS/S divisions; (3) provide training and transportation for MPH sanitationists; (4) train villagers in RWS/S; (5) help the RWS Division complete the proposed program's piped water supply portion and reestablish its maintenance responsibility; (7) train two RWS/S staffers, one each in the respective technical programs, and one each in management, supervision, organization, and logistics; and (8) develop options for water supply and excreta disposal interventions responsive to village needs (specific suggestions are included).

AID/DSPE-C-0053 932087700

Paper copy $17.55 Microfiche $2.16

098 **PN-AAJ-134**

HEALTH FOR HUMANITY: THE PRIVATE SECTOR IN PRIMARY HEALTH CARE

National Council for International Health, 6th International Health Conference, Washington, D.C.
1979, 127 p.

Sponsored by the National Council for International Health

Focusing on primary health care (PHC) delivery has, over the past five years, markedly improved the health status of the world's poor. These proceedings of the sixth international conference of the National Conference for International Health document the key role played by private voluntary organizations (PVO) in this process. Under the general heading of the private sector's role in PHC, consideration was given to the economic constraints faced by PVO's in PHC delivery; the need

to emphasize village-level delivery of PHC; stimulating community response; and fielding PHC pilot projects. Funding PVO health projects was discussed from the viewpoint of A.I.D. and PVO managers. A section on recruiting, training, and retaining PHC personnel includes papers on the training programs of CARE and the Canadian University Service Overseas, and on Save the Children Foundation's strategy for developing community PHC awareness. The latter subject was also discussed from the viewpoint of the Pan American Health Organization (PAHO), Canadian and Guatemalan PVO's, and, more generally, as a requisite to promoting village health and well-being. Other papers treated PVO interaction with the World Health Organization (WHO) in achieving good health for all by the year 2000; Catholic Relief Services' experience in maternal and child health programs; primary eye care delivery; requirements for an effective health worker; and the use of oral rehydration therapy in PHC. Finally, case studies were presented on community PHC delivery by mission hospitals in Haiti; the role of mission hospitals as agents of change in Zaire; and the use of PVO's in Tanzania. Questions that run throughout the papers included: whether access to the community is best accomplished through direct PHC programs or through interventions in other areas of need such as education; how political factors aid or impede PHC programs; and how best to use limited health assistance financial resources. A list of conference participants is appended

AID/SOD-PDC-G-0202 932012300

Paper copy $16.51 Microfiche $2.16

The report of the 1978 WHO-UNICEF Conference on Primary Health Care identified immunization against the major infectious diseases as one of nine key basic components in primary health care. Here, a health worker administers an oral polio vaccine to a young Thai child.

099 **PN-AAJ-253**

WHOLESOME AND PALATABLE DRINKING WATER: A BACKGROUND PAPER ON WATER QUALITY ASPECTS OF WATER SUPPLY; VOLUME I

Chamberlin, C.E.; Boland, J.; Malik, A.; Shipman, H.
1979, 108 p.

Volume II, Appendices, published separately: PN-AAJ-254, 61 p.

To provide background material for A.I.D.'s participation in the World Water Supply and Sanitation Decade, a panel of experts prepared a two-volume report (text and appendices) on water quality—defined in terms of wholesomeness and palatability—and its role in devising rural water supply (RWS) programs in developing countries. Discussed in turn are the historical development of water quality standards; contemporary techniques for assessing water quality and the difficulty of applying these standards in developing countries; and trade-offs between the quality and availability of water in RWS programs. Contemporary water quality assessment relies heavily on the same techniques, albeit more sophisticated and complex, employed since the turn of the century. The principal techniques are sanitary surveys—field investigations examining environmental surroundings and potential routes of water source contamination—and multivariate chemical and biological analyses to detect bacteria and toxic contaminants. In the United States and Europe, regulatory standards (based on laboratory analysis guidelines) have been adopted to ensure water quality. Considerable controversy exists, however, on the uniform application of these highly sophisticated, urban-based standards and techniques to developing country RWS programs. Strict application of developed world standards may unnecessarily condemn developing country RWS's and lead to the use of more peripheral and lesser quality sources. Development experience shows that, in addition to chemical and biological requirements, water quality standards should depend on the availability and costs of water treatment technology, the plausible alternative investments in public health (waste removal, health education), the number of persons exposed to the water source, and local practices concerning palatability and water use. In designing RWS systems, the managerial and operational requirements contingent to water quality (i.e., continuous treatment of the water) must be guaranteed because the simple provision of water can be counterproductive if its quality is harmful.

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100 **PN-AAJ-254**

WHOLESOME AND PALATABLE DRINKING WATER: A BACKGROUND PAPER ON WATER QUALITY ASPECTS OF WATER SUPPLY; VOLUME II, APPENDICES

Chamberlin, C.E.; Boland, J.; Malik, A.; Shipman, H.
1979, 61 p.

Volume I, Main Report, published separately: PN-AAJ-253, 108 p.

To provide background material for A.I.D.'s participation in the World Water Supply and Sanitation Decade, a panel of experts has prepared a two-volume report (text and appendices) on water quality—defined in terms of wholesomeness and palatability—and its role in developing rural water supply (RWS) programs in developing countries. This second volume consists of two appendices to the main report. Appendix A is a 211-item bibliography with one item in German and the others written in or translated into English. Appendix B describes the history of contemporary drinking water standards, including those of the U.S. Treasury Department, U.S. Public Health Service, and U.S. Environmental Protection Agency; as well as those designed for Europe and the international community by the World Health Organization (WHO). Types of water supplies to which the standards apply, recommended analytical methods, requirements regarding water source and protection, and bacteriological, virological, physical, chemical, and radiological standards are discussed.

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101 **PN-AAJ-692**

THE COST OF PRIMARY HEALTH CARE

Gaspari, K.C.
1980, 34 p.

Estimating the cost of primary health care (PHC) for a developing country is a deceptive and complicated task, and efforts to apply benchmark estimates to specific programs can lead to misuse of health care resources. This paper addresses this problem by providing a conceptual framework for estimating PHC costs and illustrating the importance of program-specific cost projections. The key to costing out PHC is to determine the factors which contribute to costs and then to measure them accurately. The first step in factor cost determination is to define the function and scope of desired services by defining the size and specific health needs of the target population and the number of them to be affected by the proposed service. Second, costs associated with the actual services rendered to meet the PHC objective need to be determined. Other cost factors include: (1) the extent to which current health care infrastructure (health education, training, transportation, domestic manufacturing) must be expanded or created to facilitate delivery of the proposed services; (2) the effects PHC produces in competing with other sectors for like resources, e.g., building materials, energy, etc.; (3) the duration of the proposed project in order to ensure that both one-time and recurrent costs are included; and (4) indirect costs caused by the spillover effects of a PHC project, e.g., increased water usage in a village. To ensure accurate measurement, costs

should be divided according to function and then separated in terms of one-time or recurrent, direct or indirect, in accordance with the principles of full, differential, and responsible cost accounting. After applying his guidelines to an actual PHC plan in Senegal to illustrate common mistakes and deficiencies in PHC cost estimation, the author concludes by noting that despite the need to determine PHC costs on the basis of the specific size and health needs of the target population, PHC projects can be categorized and compared according to their similarities, e.g., in regard to population, duration, and services, while still avoiding the concept of set costs per person. A 57-item bibliography (1961–80) is appended.

AID/otr-147-80-84

Paper copy $4.42 Microfiche $1.08

102 **PN-AAJ-882**

THE NONPHYSICIAN AND FAMILY HEALTH IN SUB-SAHARAN AFRICA; PROCEEDINGS OF A CONFERENCE

Waife, R.S.; Burkhart, M.C.
Pathfinder Fund, Family Planning Evaluation Center.
1981, 150 p.

Proceedings of a Conference held September 1-4, 1980 in Freetown, Sierra Leone

Due to a shortage of trained medical personnel, most health care in Sub-Saharan Africa is dispensed by nonphysicians (NP's). This report presents the proceedings of the first international conference on NP's and family health in Sub-Saharan Africa. At the conference, held in Freetown, Sierra Leone September 1–4, 1980, representatives of 24 nations discussed the health needs of Sub-Saharan Africa, the need for NP's, the roles and training of NP's, and needed policy changes. The participants agreed that in employing NP's to improve health in Africa (especially maternal/child health, the most frequently cited problem) efforts should first be made to treat the root causes of low health status—high pregnancy rates, poor health facilities, poverty, and ignorance. Specific problem areas requiring NP services are infertility, female circumcision, immunization, nutrition; and environmental sanitation. Specific NP programs in Kenya (child malnutrition), Mississippi (reduction of infant mortality), Thailand (family planning), and Togo (Family Welfare Program) were discussed. Noted as constraints to effective NP action were physician resistance, a lack of support structure, poor management, irregular flow of supplies to the field, and the lingering faith in useless or harmful traditional medical practices. The conference suggested that the NP's role as an agent of social change might be expanded by providing training in effective communication and motivation techniques. Other recommended changes in NP training included: (1) training teams of NP's in which each team member is first trained in one task and is later exposed to the other tasks; (2) emphasizing preventive medicine; (3) encouraging the use of effective traditional remedies; and (4) matching training to local needs by consulting local health care officials. Alternative strategies for adopting policy changes supportive of NP's include reassigning certain medical duties to NP's, altering ministerial rules and regulations affecting NP's duties, and passing legislation in support of NP's. Four workshops were also held during the conference—one each on rural and urban health needs, one on a child spacing program, and one dealing with high-risk pregnancies. A list of conference participants is appended.

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103 **PN-AAJ-901**

TWO-WAY RADIO FOR RURAL HEALTH CARE; AN OVERVIEW

Goldschmidt, D.; Hudson, H.E.; Lynn, W.
Academy for Educational Development.
1980, 63 p.

Increasing attention is being devoted to developing innovative ways of extending health care to rural areas. Toward this end, two-way radio is an effective tool which embodies technology appropriate to rural needs, is easy to maintain and use, and is relatively inexpensive. Based on developed and developing country experience, this report outlines the operation, uses, and possible problems of applying two-way radio to rural health care delivery. Experience has shown two-way radio to be most useful in medical consultation, referral, and administration; coordinating patient transport; providing continuing education to rural health workers; relaying non-health messages; and responding to disasters. A radio systems' actual use, however, will depend on the design of both the health care system and the radio network, the health workers' training and degree of isolation, and the type of assistance available by radio. When implementing a communication system, both capital costs—the cost of buying and installing the equipment (i.e., a transceiver and an antenna), and operational costs—the cost of power (e.g., AC current, a battery, a small generator, solar collector panels), maintenance, personnel, and equipment depreciation must be considered. While it is often difficult to establish precise causes when a radio system fails, poor system design, failure to meet the user's perceived needs, insufficient training of users, inadequate operation and maintenance procedures, lack of spare parts, and/or power supply problems are likely contributors. In addition, although using contractors may ensure technical competence, the cost and quality of operations can still be quite variable. Summaries of North American projects using narrowband technologies for transmission of visual information, heart sounds, EKG's, and patient record data are also given. Appended are a breakdown of radio system costs in Guyana, Bangladesh, and Nicaragua; a summary of two-way communication technologies; summaries of 53 two-way communication projects for health services delivery; and a 47-item bibliography (1973–80).

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104 **PN-AAH-806**

BALANCED URBANIZATION, SPATIAL INTEGRATION, AND ECONOMIC DEVELOPMENT IN ASIA: IMPLICATIONS FOR POLICY AND PLANNING

Rondinelli, D.A.
1980, 17 p.

In Urbanism Past and Present, No. 9, 1979-1980, pp. 13-29

Although 12 of Asia's metropolitan centers are among the world's 35 largest cities, and half of all Asians are expected to be urbanites by the year 2000, this report on urbanization and spatial patterns in East and Southeast Asia argues that it is not the pace but the pattern of urbanization which poses problems for developing countries. Asian nations are characterized by pervasive economic dualism and spatial polarization because past development efforts and investments have favored primate cities (the main urban center, usually the capital), and "trickle down" processes have failed to spread to rural areas. Tendencies toward polarization originating in the colonial era have become self-perpetuating, further aggravating the situation. As a result, primate cities are now islands of modernization dominating over secondary cities and stagnant rural areas. Migration from rural to urban areas reinforces this primacy. The pace of urban growth in Asia is fast and increasing, but most primate cities are severely limited in their ability to absorb larger populations without creating or exacerbating such problems as extensive slums, large-scale unemployment, air pollution, and strained public facilities. Although some theorists argue that as economic growth accelerates, equity problems will be ameliorated and spatial polarization will be reversed automatically, this author argues that a deliberate strategy of decentralized urbanization is needed to disperse urban growth, accelerate rural development, and promote and absorb development inpulses already strong in primate cities. Such a policy must aim to: (1) maintain and improve critical services and facilities in metropolitan centers; (2) control growth in the primate city; (3) stimulate growth of regional metropolitan areas and intermediate-size cities; (4) strengthen existing and incipient market towns as rural service centers; (5) create strategic villages as agricultural service centers; (6) tie decentralized urbanization policies to integrated rural development programs; and (7) strengthen the linkages among settlements in regional and national spatial systems.

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105 **PN-AAH-869**

REPORT ON PERUVIAN "PUEBLOS JOVENES" PROBLEMS AND POSSIBILITIES FOR USAID IIPUP TECHNICAL ASSISTANCE

Dicker,H.; Giraldo, A.; Rivkin, G.W.
Rivkin Associates, Inc.
1979, 89 p

The residents of pueblos jovenes (low-income squatter settlements) suffer the worst effects of Peru's economic crisis and are often deprived of essential public services. This survey identifies the service needs of Lima's pueblos jovenes and recommends alternatives wherein A.I.D.'s Integrated Improvement Program for the Urban Poor (IIPUP) can provide technical assistance, training, and identify projects to upgrade service delivery. The report details the major problems faced by the pueblos jovenes in the fields of housing, health, education, child care, and community organization. Analysis is made of public and private institutions with programs that impact on the quality of life in the pueblos jovenes in order to identify resources and to suggest ways in which these institutions may be strengthened. To relieve a major constraint to the present study and in view of the transitional political situation in Peru prior to the 1980 elections, it is recommended that in FY80 IIPUP funding be used to collect data regarding: (1) typologies of the target population; (2) the shelter sector in terms of needs, standards, access to credit, etc.; (3) vocational training and employment prospects; (4) the range of private voluntary organizations; (5) health status of pueblos jovenes populations; and (6) women's socioeconomic status and needs. An aerial photographic survey is recommended as the most efficient means of identifying locations, sizes, perimeters, and population of the pueblos jovenes. IIPUP projects in the six above-mentioned areas are recommended for post-election funding. Specific areas of assistance include: (1) project management training for the Ministry of Housing; (2) the development of vocational training to meet the employment needs of the population; (3) income-generating projects; (4) coordination of private and public institutions' resources; and (5) ancillary studies on the extent and means of improving sanitation and housing facilities. Information on aerial photographic surveys, individuals contacted by the consultants, and a 32-item bibliography (1975–79) in English and Spanish are appended.

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Paper copy $11.57 Microfiche $1.08

106 **PN-AAJ-078**

GUINEA: SHELTER SECTOR ASSESSMENT

National Savings and Loan League.
1980, 97 p.

To help the Government of Guinea (GOG) address a severe urban housing shortage caused by an urban population growth rate twice the national average, this report assesses Guinea's shelter sector and offers recommendations to the GOG to improve this situation. Against background descriptions of Guinea's national economy and the living conditions of the urban poor, the urban shelter problem is analyzed in terms of settlement patterns, extant housing stock and public utilities, and available institutional and noninstitutional housing resources. The report projects a need for 30,000 new housing units over the next 5 years to accomodate urban growth (the GOG currently plans 10,000). It is recommended that the GOG stress the use of underutilized domestic materials and financial resources to reduce the drain on public housing resources caused by importing building materials and by the subsidized system of public housing construction which favors GOG

employees. Because replication of current housing standards is not feasible in urban centers, where institutional capability is lacking, incomes are lower, and service costs higher, it is recommended that the GOG stimulate activity in the informal housing sector. Financially, the GOG should: (1) reactivate the housing finance role of the National Bank for Commerce, Industry, and Housing to make credit available to low-income urbanites who suffer most from the housing shortage; (2) provide seed capital and assure the supply of external funds to the proposed system of neighborhood council housing loan guarantees; and (3) move towards full cost recovery in existing and proposed public housing programs. In terms of building materials, the GOG should: (1) encourage the production and use of local materials on both an artisanal and industrial scale; and (2) rehabilitate and improve the operation and maintenance of the existing building materials industry. Finally, regarding land use, the GOG should: (1) better coordinate responsibility among its land use ministries; (2) speed up provision of land under public leasehold; and (3) price land to recover enough revenue to reinvest in new development and to recoup the surplus value resulting from its intervention.

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Paper copy $12.61 Microfiche $1.08

107 **PN-AAJ-374**

URBAN POVERTY IN GUATEMALA

Haeckel, B.; Farber, M.; Cuadrado, L.
Abeles, Schwartz, and Associates.
1980, 358 p.

Guatemala's urban poor may be better off materially than her rural poor, but they feel poorer because of the stark contrast between themselves and the urban rich. This study examines the characteristics and distribution of urban poverty in major Guatemalan cities and the measures being taken to alleviate this poverty. Included are a brief analysis of the major population shifts contributing to urban poverty in Guatemala; a profile of the urban poor, their work, income, expenditures, homes, and perceptions; an analysis of key institutions serving the urban poor, with emphasis on the access of the poor to the benefits of public programs; and a brief review of spatial trends in public investment. Over the past 30 years, population has grown almost twice as fast in Guatemala's cities as in her rural areas, largely because of migration from rural areas and smaller cities, with the focal point of growth being Guatemala City. A majority of the urban poor work in small-scale industry, especially construction, and income from formal work is often supplemented by side jobs. Evidence, while sketchy, suggests that income distribution is among the most unbalanced in the hemisphere. In addition, the construction of minimum-standard urban shelter currently reaches only 25% of the current national goal of 26,000 units. Those not serviced by public or private housing resort to squatting on the outskirts of urban areas or to building their own shelter from precarious materials in areas providing little access to public water and disposal services. The ability of city governments to render municipal services required by law (potable water, sewers, street cleaning) suffers from several major institutional weaknesses, including poor coordination of public services, undefined responsibility for planning, poorly qualified personnel, an inadequate system of municipal finance, and a lack of citizen participation. The 37-fold increase in public investment over the past 9 years has focused mostly on agriculture, transportation, energy, and health, with investments largely concentrated in the Department of Guatemala and in the Southern Departments of Escuintla and Santa Rosa. Housing and education have received only modest attention. Survey data and a 59-item bibliography (1972–80) are included.

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Paper copy $46.54 Microfiche $4.32

108 **PN-AAJ-399**

DISASTER ASSISTANCE MANUAL FOR TRANSITION HOUSING

Oakley, D.
Planning and Development Collaborative International (PADCO), Inc.
1981, 246 p.

Disaster Assistance Manual, Volume I

Following a disaster, A.I.D. often provides housing both to meet victims' immediate shelter needs and to create a base from which to reconstruct permanent housing. This manual for A.I.D and host country disaster assistance and housing officials focuses on expeditious planning and implementation of conventional, contractor-built, low- and middle-income, transitional housing. Emphasis is placed on A.I.D.'s potential contribution and lessons learned from past experience in the following areas: (1) disaster assessment; (2) operational responsibility; (3) project beneficiaries; (4) project timing; (5) environmental considerations; (6) land ownership and financing; (7) site selection, location, layout, and access; (8) phased occupancy and implementation of infrastructure; (9) safe housing program components; (10) cyclone-, flood-, and earthquake-resistant design; and (11) project management and evaluation. A.I.D. can make the greatest contribution in the areas of supply procurement, quality control, project oversight, training, site preparation, and information sharing and by assisting the disaster victims prior to project start-up. In conclusion, the author cautions that contractor-built housing—not always the type of post-disaster assistance preferred by A.I.D.—may not be the best strategy for providing transitional, post-disaster housing, since such shelter can by its very nature serve only a limited number of victims and meet only a small portion of their total post-disaster needs. The author also points out that implementing such a housing project should not preclude providing post-disaster assistance to other sectors. In addition, care must be taken to plan for the staged occupation of the housing site and for beneficiary relocation, as well as for providing basic infrastructure and services. Appendices include a discussion of core housing and progressive upgrading.

Workers construct earthquake-resistant housing based on avoidance of poor ground conditions, faulted ground, or potential landslip areas as well as on use of small building design criteria which results in structural integrity in all dimensions.

building guides for A.I.D. reconstruction projects, an investigation of recipients' views of finance systems, a housing project budget estimation form, a list of 37 organizations and 14 journals in the field of relief and development, and a 17-item general bibliography (1973–80). Additional references are included with each chapter.

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109 PN-AAJ-815

INTEGRATED IMPROVEMENT PROGRAM FOR THE URBAN POOR: AN ORIENTATION FOR PROJECT DESIGN AND IMPLEMENTATION; VOLUME I

Planning and Development Collaborative International (PADCO), Inc.
1981, 167 p.

Volume II, Annexes, published separately: PN-AAJ-816, 116 p.

A.I.D.'s Integrated Improvement Program for the Urban Poor (IIPUP) aims at alleviating the severe shortages in shelter and other essential areas (e.g., employment) suffered by the poor who constitute the growing majority of urbanites in developing countries. This state-of-the-art report presents guidelines for designing and implementing IIPUP projects. Fundamental assumptions of IIPUP are that assistance programs should address both the causes and consequences of urban poverty in ways that are comprehensive (to address many different needs simultaneously) and integrated (to minimize duplication and improve efficiency). Besides establishing appropriate goals and purposes, IIPUP project designs should identify beneficiaries and select those project components most likely to meet the former's needs; choose appropriate ways to integrate services in concrete circumstances; provide adequate funding and ensure continuity of financing after the initial project phase; plan for gradual project implementation in accordance with the degree of host country acceptance; and, if need be, initiate changes in existing laws. A wide range of organizational, operational, and personnel problems face IIPUP project management. Pre-planning may remove some causes of conflict between participating agencies. Appointment of an appropriate project manager or chairperson of the project executive committee is a key element in successful implementation. Training components must often be included to provide adequately trained personnel for project implementation. A large amount of information, most of it available from secondary sources or interviews with host country officials, is required to plan and evaluate IIPUP projects. It is important, however, to limit data collection to what is actually needed. Several survey methods are available, including a simple method using aerial photographs. Effective project evaluation is important to improve the design of later projects.

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Paper copy $21.71 Microfiche $2.16

110 PN-AAJ-816

INTEGRATED IMPROVEMENT PROGRAM FOR THE URBAN POOR: AN ORIENTATION FOR PROJECT DESIGN AND IMPLEMENTATION; VOLUME II: ANNEXES

Planning and Development Collaborative International (PADCO), Inc.
1981, 116 p.

Volume I: PN-AAJ-815, 167 p.

Rapid urban growth in developing countries has led to serious deficits in the provision of shelter and other essential goods and services to the poor who constitute the vast and growing majority of urban dwellers. To help A.I.D. alleviate the plight of these poor, a state-of-the-art report has been prepared on the design and implementation of A.I.D.'s Integrated Improvement Program for the Urban Poor (IIPUP). This companion volume contains four annexes to that report. The first annex discusses IIPUP project components—shelter provision, assistance to small-scale enterprises, other employment assistance, informal adult education, environmental sanitation, urban health services, public transportation, participant mobilization, and improvement of the welfare of the neediest groups. The second annex presents case studies from U.S. and international (India, Honduras, Zambia, Indonesia, and Kenya) experience in urban improvement projects. The third annex offers a comprehensive checklist of data requirements (demographic, social, economic, housing, health, welfare, labor, education, transportation and communications) for designing and evaluating IIPUP projects. The final annex is a 90-item bibliograhy (1959–80).

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Paper copy $15.08 Microfiche $2.16

111 **PN-AAJ-174**

A REVIEW OF ISSUES IN NUTRITION PROGRAM EVALUATION

Sahn, D.E.; Pestronk, R.M.
Community Systems Foundation.
1981, 231 p.

A.I.D. Program Evaluation Discussion Paper No. 10

Despite agreement that evaluation is integral to development programs, substantial diversity exists on the best methods of evaluating nutrition interventions. This report, based on the present practices of several multilateral, bilateral, and private donors, reviews these methods. The authors propose standardized evaluation terms and concepts for examining nutrition education, supplementary feeding, food fortification, multisectoral, and planning programs. Presented are two models of nutrition programming—A.I.D.'s logframe, outlining a causal progression of events at the input, output, purpose, and goal levels; and the Nutrient Flow Model, depicting nutrition as a function of activities such as food production, trade, loss, and distribution. Linked to each of these models, respectively, are process and impact evaluations. For process evaluations (often conducted along with impact evaluations), information is collected on pre-existing indicators, project components, and intervening events in order to reveal nutritional improvements attributable to a program. Impact evaluations seek to determine improvements in overall nutritional status. Various impact evaluation designs (e.g., situation assessment, before/after, recurrent institution cycle, comparison groups) and threats to their internal and external validity are reviewed. The authors also discuss alternative evaluation methodologies which combine aspects of both evaluation types to assess such program aspects as effort, adequacy, appropriateness, etc. They also differentiate operational program evaluation (analysis of a program's specific impact and performance), the subject of this report, from basic research (knowledge gained using scientific

Dietary nutritional measurements are one way of evaluating programs designed to make sure that poor children under five years of age in the developing world, such as these African children, will avoid malnutrition and the morbidity or mortality that are all too often its consequences.

methods and controlled experimentation) and evaluative research (field testing applications of existing knowledge). Anthropometric, biochemical, clinical, and dietary nutritional measures are examined in terms of objectivity, coverage, directness, completeness, and precision. Also presented are 70 abstracts of published evaluations, emphasizing methodology over outcomes, and brief descriptions of the programs and approaches of several donors involved in nutrition programs. A 171-item bibliography (1955–80) is appended.

AID/otr-147-80-91

Paper copy $30.03 Microfiche $3.24

112 **PN-AAJ-321**

NUTRITIONAL ANEMIA RESEARCH; A REPORT ON A FIELD PROJECT CONDUCTED IN GUYANA FROM JUNE 23 TO AUGUST 6, 1980

Johnson, A.A.
Howard University, School of Human Ecology, Department of Human Nutrition and Food.
1980, 57 p.

Nutritional anemia constitutes an important public health problem affecting all age groups in Guyana. This paper reports on a field study conducted to investigate the roles of iron deficiency, folic acid deficiency, and intestinal parasitic infestation in contributing to this anemia. Anthropometric (height and weight) and hematological (red blood cell count, hematocrit, hemoglobin, plasma and red cell folate, and serum ferritin) measurements, and stool investigations for intestinal parasites were performed for 257 anemic or nearly anemic subjects representing all age groups and both sexes in urban and rural areas. Socioeconomic data, data on the frequency of consumption of foods rich in the erythropoietic nutrients, and information on use of iron and vitamin supplements were also obtained. A limited amount of obstetrical information was obtained from women of childbearing age. Iron and folic acid deficiencies were found to be the major nutrient deficiencies contributing to nutritional anemia. Intestinal parasite infestation did not play a major role. The author recommends an applied intervention program involving nutrition education, an improved system of distributing iron and folic acid supplements to pregnant and lactating women, and fortification of a suitable vehicle with iron and folic acid. Also recommended is focusing nutrition education on the nature, symptoms, and causes of nutritional anemia and on how anemia can be prevented by a proper diet incorporating local foods. Radio, newspapers, posters, pamphlets, demonstrations, and cinema advertising are suggested as possible educational tools. Problems and possibilities associated with use of wheat flour, sugar, rice, and salt as the vehicle for iron and folic acid fortification are discussed. Iron (III)-EDTA is suggested as the most promising compound to use for iron fortification with ascorbic acid added to promote the absorption of iron from the food and to prevent folic acid deterioration. A 17-item bibliography (1956–78) is included. The protocol for collecting and processing blood samples and a copy of the questionnaire used in the study are appended.

AID/504-C-80-5 931022714

Paper copy $7.41 Microfiche $1.08

113 **PN-AAJ-375**

A STRATEGY FOR FOCUSING A.I.D.'S ANTI-HUNGER EFFORTS

A.I.D., Technical Program Committee for Agriculture.
1981, 58 p.

A.I.D. response to "Overcoming World Hunger: The Challenge Ahead— Report of the Presidential Commission on World Hunger": PN-AAJ-482, 276 p.

The *Report of the Presidential Commission on World Hunger* concluded that the main focus of U.S. policy towards developing countries should be the elimination of chronic malnutrition caused by poverty. In this paper, A.I.D.'s Technical Program Committee for Agriculture (TPCA) proposes a strategy to maximize A.I.D.'s anti-hunger efforts. After reviewing the current hunger situation, the TPCA concludes that hunger must be attacked on a double front—improving production while increasing the purchasing power of the hungry. The proposed strategy is aimed at helping developing countries build, over decades, the human and institutional capacity needed to promote small-scale or broad-based, labor-intensive, commercial agriculture, thus employing more people while improving production capacity. To implement such a strategy, A.I.D. should focus on Human and Institutional Resource Development (HIRD) projects, stressing applied agricultural research (especially regarding dry farming) and the establishment of self-sustaining agricultural institutions. A.I.D's ability to implement such a strategy faces several challenges: lack of trained technical assistance personnel and funds both by A.I.D. (despite U.S. public opinion support for an anti-hunger campaign) and by developing countries; the general lack of political will to eradicate hunger; and A.I.D.'s inability to define nutrition goals clearly and pursue them cohesively. Mounting an effective anti-hunger campaign will require that A.I.D. change its structure, especially regarding the management of its own resources and those allocated to other international agencies. This change is essential for building public and political support while attaining a position of credible leadership in the global anti-hunger effort. A total of 15 recommendations concentrate on developing an operational focus, articulating a full commitment, training effective personnel, seeking alternate funding, revising selected regulations, and increasing public education on hunger issues.

Paper Copy $7.54 Microfiche $1.08

114 PN-AAJ-693

NUTRITION IMPACTS OF LIVESTOCK DEVELOPMENT SCHEMES AMONG PASTORAL PEOPLES

Teitelbaum, J.M.
U.S. Department of Agriculture, Food and Nutrition Service.
1980, 174 p.

In many instances, livestock projects have wrought, albeit unintentionally, adverse effects on the food supply and way of life of nomadic peoples. This report discusses the traditional diet and way of life of the pastoralists and examines the impact on these of livestock development strategies. Rather than relying on their herds for food, pastoralists derive the greater part of their diets from cereals (millet, barley, maize, sorghum, etc.). However, milk-based foods provided by the herds do play a critical part in their diet and health by enhancing the lower protein content of their starchy cereal staples and, as suggested by some researchers, by providing protection against malaria and other diseases. Development projects have clashed with the herding practices and culture of the pastoralists in a number of ways. For example, development aimed at husbandry of a single cash-crop species such as cattle or sheep denies pastoralists the advantage of having a number of milk yielders productive under a variety of conditions. Destocking rangelands in order to adjust animal numbers to the theoretical carrying capacity of the land or to cull diseased and aging stock places herd management beyond the reach of the pastoralist. Strategies promoting sedentary living require infrastructure and services not as critical to, and therefore absent from, the nomadic way of life. For the pastoralists, livestock provide immediate offtake and serve as a renewable resource investment—in contrast to the Western view that rangeland is the basic resource, with meat as a cash-crop. In addition to a general discussion of A.I.D. development efforts, the report includes specific project case studies in Morocco and the Sahel. The author concludes that livestock project designers should focus on real and immediate food needs; take into consideration existing land use and water access rights; recognize that the herding of mixed species is necessary to the pastoralist milk supply system; and encourage cultivation of rangelands. Also, livestock projects should include health care and adult education components, and beneficiaries should be given greater decisionmaking powers.

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Paper copy $22.62 Microfiche $2.16

115 PN-AAJ-694

NUTRITIONAL CONSEQUENCES OF RURAL-URBAN MIGRATION

Graedon, T.
1980, 83 p.

Available data indicate that rural-urban migrants in developing countries enjoy a nutritional status as good as, if not better, than those they left behind. In examining the consequences of internal migration on nutrition, this study considers the major factors contributing to migration, the linkages between migration and nutritional status, and some resulting policy implications. People migrate from rural areas to the cities mainly for economic reasons such as higher wages and better job potential, although urban family ties and better education and health facilities are also factors. Linkages between migration and nutritional status generally stem from major lifestyle changes involved in migrating. Among migrants, the major changes affecting their nutritional status involve the availability of jobs and the average wage rate in the city, the woman's position as wage earner and/or mother (assuming a traditional family migrated as a unit), the availability of food in the city, and the migrant's general state of health. The few studies available indicate that most migrants benefit from living in the city; employment and total household income among migrants are higher than among urban-born; higher-volume city markets provide greater accessibility and lower product costs; and urban health facilities and education are superior. The effect of outmigration on the sending areas, however, appears detrimental to rural nutritional levels because subsistence farming is often replaced by cash crop production because it is less strenuous for the nonmigrating workforce (usually women and the elderly). Intense outmigration can also result in rural labor shortages, increased stratification, and occasionally social and cultural dislocations. To mitigate the negative effects of migration, agricultural planners should avoid introducing technology which reduces the local need for labor, e.g., mechanization; take into account current and projected dietary intake of various sectors of the population; and preserve crop diversity while avoiding disruptions to food production and to infant and child care. Appended are a 72-item reference list (1961–80) and several hypothetical scenarios illustrating the migration-nutrition relation.

AID/otr-147-80-90

Paper copy $10.79 Microfiche $1.08

116 PN-AAJ-242

RESEARCH ON SIMPLIFIED TECHNIQUES OF FERTILITY MANAGEMENT; SEMIANNUAL REPORT, APR-SEPT, 1980

Johns Hopkins University, School of Medicine.
1980, 201 p.

The status of six AID-sponsored research projects on simplified techniques of fertility management is reviewed in this semiannual report. Project I examines effective inexpensive methods of reversing tubal sterilization. The first 18 of 28 female pairs have been subject to randomized treatment. The results, however, are inconclusive as data is still accumulating. Project II seeks to develop improved tubal ligation methods. The examination of 79 previously ligated fallopian tubes suggests that oviductal ligation within 4 cm of the uterine cornua may predispose to the development of endometriosis and subsequent fistulization. Project III, to identify and evaluate safer and more practical abortifacients, is now starting after equipment delivery delays. Animal testing of chemical abortifacients is the subject of Project IV. Four substances are considered: D-Trp^{6}–Pro^{9}–Net, an LRH analogue, will be injected into pregnant monkeys and followed to determine its antifertility effects. Allenic alcohol, a "suicide substrate" that irreversibly binds and inactivates enzymes, will be tested in pregnant rats for antifertility and progesterone and corticosterone induction effects. Epsilon amino caproic acid, a fibrinolytic inhibitor, was injected into pregnant rats and found to interfere with fibrinolytic activity important at the time of implantation for pregnancy maintenance. Experiments in which 1% silver nitrate was injected into the uterine cavity of pregnant monkeys showed it to be effective in terminating early pregnancies. Project V is aimed at evaluating three agents previously determined by animal studies to be effective chemical abortifacients. Azastene studies have been halted due to lack of volunteers for the 7–8 days treatment. Clinical trials of ethanol will begin pending protocol approval. Finally, the use of analgesic agents not associated with respiratory or cardiac depression is being studied for abortion and other local anesthesia procedures. Project VI, to assess the safety and efficacy of cervical dilatation methods such as the International Fertility Research Program's osmotic cervical dilator, is just beginning. Included is a 6-month work plan, graphs of anticipated expenditures, and copies of manuscripts currently in press or being finalized.

AID/DSPE-C-0054 932054800

Paper copy $26.13 Microfiche $3.24

117 PN-AAJ-373

REASSESSMENT OF THE PROSPECTS FOR FERTILITY DECLINE IN EGYPT: IS DEVELOPMENT A PREREQUISITE?

Omran, A.R.
North Carolina University.
1980, 69 p.

Is socioeconomic development more effective than family planning (FP) in reducing fertility in developing countries? This report explores this question by analyzing Egypt's demographic history since 1800 and recent trends in its population policy. Pre–1973 efforts chiefly consisted of providing contraceptives. This resulted in a drop in the birth rate from 43.0 to 34.4 per 1,000 from 1963–72. In 1973, Egypt reoriented its population policy to emphasize the developmental approach, i.e., aiming to reduce fertility through higher living standards, education, female employment, agricultural mechanization, rural industrialization, reduced infant mortality, improved social security, information dissemination, as well as the provision of FP services. Despite these efforts, birth rates rose to 41 per 1,000 in 1979. This rate, if continued unchecked, would lead to a doubling of Egypt's population in 23 years, exhaust cultivable land, and increase dependence on foreign aid and imported food. Weaknesses in the FP program in Egypt under the developmental approach include a low participation rate (only 8–10% in rural areas, where the population is most concentrated); irregularity of contraceptive supply; underuse of the outreach approach; provision of FP services by only a few health or social service units; and general program inefficiency and lack of coordination. Proponents of the developmental approach cite the declining birth rates in 18th and 19th century Europe which accompanied industrialization and socioeconomic improvement to support their position. The author, however, questions the transferability of the European experience to contemporary developing countries. He explores instead the relationship between fertility and development which is unique to the Arab world, making note of Tunisia, Lebanon, and Egypt where, because of FP programs, fertility has declined without drastic changes in societal values or substantial socioeconomic development. He concludes that FP programs, by themselves, can have a significant impact independent of and greater than the impact of socioeconomic improvements. A 52-item bibliography (1936–80) is appended.

AID/ne-G-1576 298015000

Paper copy $8.97 Microfiche $1.08

118 PN-AAJ-384

1979 MEXICO NATIONAL FERTILITY AND MORTALITY SURVEY: A SUMMARY OF RESULTS

North Carolina University, International Program of Laboratories for Population Statistics.
1980, 22 p.

In 1977 Mexico established a national family planning plan aimed at reducing the country's 3.2% annual population growth rate to 2.5% by 1982 and to 1.0% by 2000. This report summarizes the findings of a 1979 National Fertility and Mortality Survey indicating progress towards these goals. The survey was multipurpose and used a two-part questionnaire: one part seeking basic demographic data from 18,505 representative households; the other collecting information on fertility, infant mortality, and related matters from 20,482 women aged 15–49 years in those same households. The survey showed that, despite evidence of a slight tendency towards aging in comparison with 1970 and 1976 data, Mexico's population is still relatively young, with 45.3% under age 15 and only 3.9% aged

65 and over. The crude birth rate was estimated at 33–37/1000 as compared with 43.4/1000 in 1977. In its most dramatic finding, the survey estimated the total fertility rate at 4.73 children per woman—a decline of 18% since the 1976 survey. Furthermore, estimates of age-specific fertility rates for single years from 1971 to 1979 showed a general downward trend for all age groups. The crude death rate, which was estimated indirectly due to incomplete reporting, was approximately 8/1000, while estimations of infant mortality rates showed a 20–25% decline over the previous 12-15 years. To estimate adult mortality rates, the death distribution, widowhood, and orphanhood methods, which, in addition to making estimates according to the age of the respondent, also delineate survivorship probabilities from birth to specific ages, were used. Despite discrepancies between methods in regard to the general level of mortality, all methods showed that mortality rates are higher for males than for females, corresponding, respectively, to levels 17–18 and 18–19 on the Coale-Demeny West Family model life tables. These estimates also allowed the crude death rate to be adjusted to 6.8–7.4/1000 and annual growth rate to be adjusted to 2.8–3.1% in the population 5 years and over. A 24-item list of references (1955–80) in Spanish and English is appended.

AID/DSPE-C-0025 932062300

Paper copy $2.86 Microfiche $1.08

119 **PN-AAJ-512**

FERTILITY AND MORTALITY CHANGES IN HONDURAS, 1950-1974

Hill, K.
National Research Council, Committee on Population and Demography.
1980, 68 p.

Committee on Population and Demography Report No. 3

Honduras, a small country having only 2.66 million people in 1974, experienced a marked decline in mortality from 1950–74. This fact, plus the wealth of various types of demographic data available, make Honduras an ideal subject for this case study, one of a series of national population studies, of changes in mortality, fertility, and population growth during the period 1950–74. Estimated fertility rates were gleaned from birth registers and the age structure of the population and were adjusted to account for inflated registration of births and underregistration in the 1974 census. Comparison of the resulting fertility estimates for each year from 1951 to 1974 shows fertility rising from 6.74% in 1951 to a peak of 7.75% in the early 1960's and then declining somewhat in the mid-1970's. Despite possible inaccuracies, primarily due to increasingly complete enumeration from 1945 to 1961 followed by a less complete enumeration in 1974, it is clear that fertility is very high and has been high—approximately 50 per 1,000—since the early 1950's. Useful information on mortality is scarce since the registration of deaths was not consistent throughout this period. Stable population analysis of the 1950 age distribution using a 1.5% annual growth rate yields a crude death rate in excess of 30 per 1,000 for that year. Although doubts about the accuracy of the 1950 data on age distribution make these estimates uncertain, it does appear that mortality fell to 19 per 1,000 during 1950–61 and further decreased to 14 per 1,000 by 1974. Although lack of data on birthplace for both Honduras and the surrounding countries make it difficult to discern the impact of international migration, it appears that the number of migrants—mostly from El Salvador—has been small. Thus, overall population growth is equal to the population's net increase, i.e., the base population as increased by births and decreased by deaths. On the basis of this assumption, the annual growth rate was estimated at 1.5% for 1950, 3.3% for 1961, and 3.6% for the early 1970's. A glossary of terms and a 14-item bibliography (1964–81) are appended.

AID/DSPE-G-0061 932064300

Paper copy $8.84 Microfiche $1.08

120 **PN-AAJ-555**

RURAL DEVELOPMENT, LAND, AND HUMAN FERTILITY: A STATE-OF-THE-ARTS PAPER

Stokes, C.S.; Schutjer, W.A.; McCoy, T.L.; Wood, C.H.
Research Triangle Institute; South-East Consortium for International Development.
1979, 122 p.

Human fertility may be reduced by altering the human-to-land (HTL) relationship, widely acknowledged as a key behavioral influence in agrarian societies. This state-of-the-art report reviews existing literature on the fertility impact of the HTL relationship and on development efforts to alter the relationship. Although the data are neither extensive nor geographically balanced, several tentative conclusions emerge concerning land/fertility relationships. All evidence indicates that greater land availability increases fertility rates by encouraging marriage. Farm size also raises fertility rates, although larger families may also be a way of acquiring larger holdings. Institutional patterns regarding access to land affect fertilility indirectly and either positively or negatively, e.g., land tenure programs can be combined with fertility incentives or, conversely, increase women's education and postpone their age of marriage. Data limitations prevented even tentative conclusions on the fertility effects of land distribution or land quality. A review of rural development literature shows that most agrarian reform and colonization/settlement programs have had a minimal effect upon the the HTL relationship due to support of traditional land access systems by political interests. Technological change can alter the HTL relationship by affecting land tenure, e.g., large landowners, who generally control technological change, tend to reclaim more productive land by evicting tenant farmers. Technological change also alters women's roles. While the net fertility effect of this is difficult to determine, it can no longer simply be assumed that rural development reduces fertility, e.g., by providing women with

socially acceptable alternatives to motherhood, and can even be fertility-stimulating. The authors conclude by posing further research questions in regard to land availability and access, inheritance, and the effects of rural outmigration; and by noting the need for adequate primary data for developing countries, especially at the household level, and for an adequate theoretical framework for interpreting the literature. Appended is a 174-item (1957–79) annotated bibliography.

AID/ta-CA-1 931117000

Paper copy $15.86 Microfiche $2.16

121 PN-AAJ-808

INCENTIVES, FERTILITY BEHAVIOR, AND INTEGRATED COMMUNITY DEVELOPMENT; AN OVERVIEW

David, H.P.
1980, 73 p.

Developing country population policies are often reinforced with incentives to reward those who limit the number of births. The range of incentives used in Bangladesh, China, India, Indonesia, Korea, the Philippines, Singapore, Sri Lanka, Taiwan, Thailand, and regions of Africa and Asia are reviewed in this paper. Both financial incentives (e.g., cash, preference in housing and land assignments, additional pensions and medical care) and disincentives (e.g., salary deductions) are utilized. A review of pertinent literature indicates that the use of incentives and disincentives to control population growth, if implemented in a balanced, non-discriminatory way, is not incompatible with human rights policies. Illustrating this point, Thailand's Planned Parenthood Association has pioneered an imaginative and successful community-based family planning (FP) service program (CBFPS) which has evolved into a broader program integrating FP initiatives into a broad range of community development projects. Most important among the author's findings are: (1) little knowledge exists about what type of incentives are actually effective in reducing births; (2) disincentives are more readily accepted when other forms of fertility control are available, when FP policies are based on a consensus between citizens and government officials, and when discrimination against children born in disregard of official policies is avoided; (3) FP policies are better received when they are oriented to community development, are sensitive to local needs, and allow local autonomy; and (4) consideration of the psychosocial and economic determinants of fertility is a necessary FP program ingredient. To ensure better FP program planning, the author recommends that: (1) the uses of U.S. Government funds for FP programs be reviewed, particularly for the integrated community development schemes that enjoy local support; (2) the psychosocial and economic determinants of fertility behavior in successful FP programs be determined; (3) an interdisciplinary seminar of FP programmers be convened to discuss problems and to determine successful program ingredients; and (4) financing for Thailand's CBFPS program for Cambodian and Laotian refugees be continued. A 183-item bibliography (1957–80) is appended.

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Paper copy $9.49 Microfiche $1.08

122 PN-AAJ-691

THE CONSEQUENCES OF ACCELERATED MORTALITY DECLINES FOR FUTURE POPULATION GROWTH AND ECONOMIC PROGRESS IN DEVELOPING COUNTRIES: A PRELIMINARY EXPLORATION

Brandel, S.K.; Gwatkin, D.R.
Overseas Development Council.
1980, 56 p.

Includes illustrative projections for Bangladesh and Mexico

Must reduced mortality be achieved at the expense of future generations' economic well-being? This study of the demographic and economic impact of efforts to accelerate mortality declines in developing countries concludes that these efforts lead to a real but manageable reduction in future economic growth. Using conventional cohort-companion methods, the authors project population growth consequences for the year 2100 of increases in life expectancy 1.5 and 2 times greater than those predicted by the United Nations for the period 1975–2100. These more rapid mortality declines would lead to a global population 2–4% larger than currently predicted for the year 2000 and 6–8% larger than expected in 2100. Regionally, the population of all developing countries would be 5.7–8.3% larger, East Asia's population would be 1.6–2.6% greater, Latin America's 1.8–2.6% higher, South Asia's 7.1–10.9% greater, and Africa's would be 9.2–14.1% larger than presently envisioned. To determine the economic effect of a larger than currently anticipated population on employment, capital growth, and technological progress, the RAPID (Resources for Awareness of Population's Impact on Development) economic forecasting model was employed using alternate scenarios of mortality and fertility change for the period 1975–2000 in two representative developing countries—Mexico and Bangladesh. These projections indicate that while both total and per capita GNP would still rise slightly, economic growth would be less than if mortality were to decline more slowly. Specifically, reducing infant mortality in Bangladesh by 60% rather than the expected 40% would slow per capita income growth by 15–20%. Reducing Mexico's infant mortality rate 30% instead of 20% will cause per capita income to increase 4–5% less than expected. The authors conclude that although faster reductions in mortality do hamper economic growth, their negative impact is less than might be anticipated. Data on the fertility and mortality assumptions underlying the population projections and on the magnitude of the actual demographic and economic consequences are appended.

AID/otr-147-79-56

Paper copy $7.28 Microfiche $1.08

123 **PN-AAG-786**

TRENDS IN U.S. FERTILIZER TECHNOLOGY: IMPLICATIONS FOR GLOBAL TRANSFER

Young, R.D.; Achorn, F.D.
National Fertilizer Development Center.
1977, 43 p.

The U.S. and world fertilizer industries, producers of the single most important input to food production, face great problems and challenges in the 1980's. This report summarizes the historical development of the U.S. fertilizer industry and suggests future technological innovations and probable trends. The report opens with the history and geographic distribution of phosphate, nitrogen, potassium, mixed, bulk blended, granular, and fluid fertilizer production in the United States. The report next outlines important innovations which occurred in the 1970's—development of efficient production processes for granular urea, powdered MAP, and high-polyphosphate liquid fertilizers. Also provided are a discussion of storage practices at phosphate, nitrogen, and finished fertilizer plants; environmental safeguards in phosphate, nitrogen, potash, and finished fertilizer production, shipment, handling, storage, and application; and recent trends in fertilizer production energy use. Many fertilizer products and processes such as those for granular ammonium phosphate, granulation of urea and ammonium nitrate, urea synthesis, and bulk blending have been disseminated to developing countries over the past 40 years, largely through the efforts of USAID, other donors, and groups such as the Tennessee Valley Authority's National Fertilizer Development Center. Although no new fertilizers are likely to soon become important, some modified products such as sulfur-coated urea, urea phosphate, and nitrogen solutions and new processes such as melt-type granulation and fertilizer compaction, flaking, tableting, and extrusion may become significant. The U.S. fertilizer industry in the 1980's will likely witness: (1) continued segmentation of production and marketing of basic fertilizers; (2) greater use of coal as a feedstock for ammonia production; (3) increased bulk handling and shipment of all fertilizers; (4) a rise in production of fertilizers containing pesticides and herbicides; (5) greater emphasis on energy savings; and (6) more study and greater utilization of marginal phosphate ores. A 42-item bibliography (1954–77) is appended, and the text is highlighted by numerous diagrams and pictures.

Paper copy $5.59 Microfiche $1.08

124 **PN-AAH-477**

GUIDELINES FOR DEVELOPMENT OF WATER/ SANITATION COMPONENTS OF URBAN FRINGE AND RURAL VILLAGE PROJECTS

Fountain, B.; Shipman, H.
Urban Resources Consultants, Inc.
1979, 128 p.

Companion Report: PN-AAH-478, 114 p. Bound with: Patents, Proprietary Processes and Methods Specific to Water Supply, Waste Disposal and Sanitation

In response to the U.N.'s declaration of 1980–90 as "Drinking Water Decade", A.I.D. commissioned a two-volume state-of-the-art study to identify existing technology and determine the need for new technology in providing water supplies and sewage systems (WS/SS) to developing countries. This second volume reviews literature on urban and rural WS/SS's; suggests strategies for WS/SS project development, particularly as components to urban, urban fringe, and rural development projects; and discusses whether WS/SS patents and proprietary processes hinder the transfer of WS/SS technology to developing countries. The literature review uncovers various WS/SS technologies for developing country use that generally are cost-effective and can be operated, maintained, and upgraded by available personnel. Water supply options, e.g., public fountains, courtyard and house connections, and hand pumps, are presented with notes on water sources to be considered in these options and with the proviso that local and USAID sanitary engineers should be consulted before final decisions on project design. To provide for sewage/excreta disposal, the options range from bore holes and vault latrines to septic tanks and conventional sewer systems. Several key needs for developing a WS/SS strategy are noted: (1) create a development blueprint to prevent the recurrence of past and present problems; (2) prioritize target locations; (3) incorporate local people, as well as their beliefs and cultural practices into WS/SS projects; (4) involve host countries in WS/SS projects from the outset, especially through pilot projects; (5) conduct preliminary engineering and feasibility studies; (6) provide for necessary staffing and construction, e.g., contract national and international experts; and (7) provide for efficient and decisive operation and maintenance of WS/SS facilities and systems. In a concluding section, the primary classes and subclasses of WS/SS equipment, devices, and processes covered by U.S. and foreign patents are listed, and it is shown that patents are only minimally effective in preventing developing countries from gaining access to technologies which they need. Included are a WS/SS patent classification, a WS/SS product directory, a list of patents of particular interest for WS/SS applications, and a 285-item bibliography (1929–78) of predominantly English titles.

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Paper copy $16.64 Microfiche $2.16

125 **PN-AAH-637**

APPROPRIATE TECHNOLOGY (AT) IN BOLIVIA: RESULTS, RECOMMENDATIONS AND REPORTS; THE VITA SURVEY OF AT IN AGRICULTURE, SMALL SCALE INDUSTRY AND ARTISANRY, WATER SUPPLY AND SANITATION AND ENERGY

Volunteers in Technical Assistance (VITA).
1980, 388 p.

The application of appropriate technology (AT) in Bolivian rural development projects has been hampered by the failure of involved institutions to coordinate their efforts. This detailed survey report, prepared by VITA, reviews the background,

issues, and current status of AT in Bolivia's sectors of agriculture, rural small enterprise, sanitation, and energy; and describes the domestic and international organizations active in Bolivian AT and rural development. AT—a self-help effort using local resoures to meet local needs in a local environment—entails, according to the VITA model, a process of technology transfer, adaptation, diffusion, acceptance, and implementation. In terms of this model, AT efforts in Bolivia are generally weakest in the transfer and diffusion stages, and are concentrated in the adaptation and initial localized acceptance/implementation stages. Although these AT programs display a vigorous variety, they reflect a top-down style of planning not responsive to campesino needs and lack referral mechanisms, knowledge of AT research findings, and a systematic approach for integrating AT into other development projects. VITA recommends a 4-year technical assistance program to upgrade the capability of the Bolivian Government's Office of Science and Technology (OCT) to coordinate the use of AT in rural development. Under the program, OCT will: (1) develop linkages with Bolivian and non-Bolivian AT institutions; (2) establish a centralized AT document center; (3) assist Bolivian institutions interested in integrating AT components into their development projects and establish a bank of AT consultants; (4) create a small projects fund to provide funding up to $20,000 to individuals or organizations for AT research, development, and diffusion efforts or related activities; and (5) manage programs in the agriculture, energy, rural small industry and artisanry, and water/sanitation sectors, with a series of pilot subprojects including data collection programs, feasibility studies, and implementation projects. Recommendations for AT activities within each sector are made. Appended is a list of 41 references (1948–79).

AID/511-179-T

Paper copy $50.44 Microfiche $4.32

126 PN-AAJ-102

TELECOMMUNICATIONS ALTERNATIVES FOR DEVELOPING COUNTRIES

Rice, R.E.; Parker, E.B.
Stanford University, Institute for Communication Research.
1979, 12 p.

In Journal of Communications, Autumn 1979, pp. 125-136

Although the benefits of satellite communication for developing countries have been well-documented, few studies exist on the barriers to actually applying such technology to meet existing needs. This study—which notes from the outset that satellite communication should be considered within the local context and as only one element in indigenous development—addresses general requirements for low-message, low-cost satellite communication that incorporates rural and secluded areas inadequately serviced by current terrestrial communication modes. This paper's primary thesis is that geosynchronous communication satellite systems (satellites orbiting at the same speed as earth and so being able to remain stationary over one portion of earth) can provide a viable alternative to traditional terrestrial telephone links if the systems are designed specifically for rural use, i.e., to accomodate a large number of low-traffic circuits and low-cost ground stations. Major requirements for developing such a system include increasing the size, cost, and output of the orbiting satellite; introducing smaller ground station antennas; choosing a ground station site which avoids terrestrial signal interference; and adopting lower ground station power requirements. Three satellite system models, one using existing INTELSAT facilities, another using separate equipment and managed by a global or regional consortium of developing countries, and the third using separate equipment but managed by INTELSAT, are identified and compared to establish a viable combination of satellite and ground station design, cost, access technique, and management technique which will provide the lowest-cost, appropriate rural telephone service. Given respective terrestrial and satellite telephone costs, the optimum structure would be one in which satellite networks provide supplemental capacity to existing terrestrial networks, especially those in rural areas. Before such a system can be designed and implemented, however, there is a need, on the policy level, to demonstrate the socioeconomic benefits of rural telecommunication; work out a multinational cost-sharing procedure; alleviate orbital congestion and allocation disputes; and find international funding for the initial capital investment. A 28-item bibliography (1967–79) is appended.

AID/ta-C-1472 931110900

Paper copy $1.56 Microfiche $1.08

127 PN-AAJ-103

SITE UNSEEN: IMPLICATIONS FOR PROGRAMMING AND POLICY

Block, C.; Foote, D.R.; Mayo, J.K.
Stanford University, Institute for Communication Research.
1979, 11 p.

In Journal of Communications, Autumn 1979, pp. 114-124

To determine whether the use of low-cost satellite broadcasting for rural educational programs in developing countries is a viable policy option, this paper analyzes the first large-scale use of satellites for such a purpose, India's SITE (Satellite Instructional Television Experiment) program. Prior to SITE, scepticism about the large-scale use of satellites was widespread, centering on whether on-the-ground hardware would remain operable; whether broadcasts would be reliable and on schedule; and whether bureaucratic support could be sustained. SITE dispelled these doubts convincingly by using community broadcast satellites to reach large numbers of widely dispersed and heterogeneous populations. Both the hardware (the number of receptors, 2,300, was unprecedented) and program delivery proved highly reliable, rivalling U.S. experience under much easier circumstances. SITE's success was largely due to superb technical management, especially by ISRO (Indian Space Research Organization), the project coordinator; the availability of a large pool of skilled personnel; and a combination of detailed system planning, rapid adapt-

The water being distributed from these storage tanks was desalinated by renewable energy in the 90-bay solar still at Awania, India. Facility production averages 1,300 gallons of water/day from brackish groundwater for Awania's 1,400 people.

ability to technical adversity, and insistence on local responsibility for local problems. While SITE's time-frame did not permit a clear assessment of its social impact, SITE did provide experience and confidence to Indian technicians and stimulated India's electronics industry and national television service. Programmatic shortcomings were not absent, however. These included: (1) fragmented broadcasting (to accomodate regional clusters) which prevented selective viewing and the development of audience loyalties; (2) a failure to identify clear social objectives, as distinct from mere entertainment, especially for evening programs; (3) discontinuity in broadcast content; and (4) lack of sustained follow-up, e.g., through planned group activities. An ambitious audience monitoring program had limited success due to the generality of viewer responses and time-lags in collating them. SITE's success, the authors conclude, should therefore be tempered with the realization that the fruitful use of satellites as a development tool requires identifying precise program goals.

AID/ta-C-1472 931110900

Paper copy $1.43 Microfiche $1.08

128 PN-AAJ-122

THE U.S.A.I.D. DESALINATION MANUAL

Buros, O.K.; Cox, R.B.; Nusbaum, I.; El-Nashar, A.M.; Bakish, R.
CH2M Hill International Corporation.
1980, 463 p.

As the world's population has grown, demand for fresh water has dramatically increased, straining available supplies and impeding development. Desalination, the removal of salts from water, offers an increasingly feasible and necessary solution to this problem. This manual outlines major desalination processes and evaluates their development, performance, potential, problems, and economics to give planners a better understanding of the applicability of desalting in developing countries. Four major desalination processes—distillation, freezing, reverse osmosis, and electrodialysis—are examined. Distillation utilizes a three-step process of vapor production, transportation to a condensor, and condensation to separate dissolved salts from water. Freezing relies on the natural fact that when ice forms in a saline solution, it leaves ice crystals of pure water. Although freezing is currently not a commercial success, there is potential for its development and future use. Reverse osmosis is a membrane separation process in which water from a pressurized saline solution is separated from solutes as it flows through a membrane. Electrodialysis utilizes alternately fixed charged membranes placed in brackish water that has been charged by electrodes to attract and trap ionized salts and leave behind fresh water. The manual details, in regard to each process, theoretical background, commercial development, engineering considerations, state-of-the-art, applications, health aspects, environmental constraints, future prospects, process experience, and applicability for developing countries The high cost and limited supply of conventional fuels has spurred the use of renewable or alternate energy sources for desalting. The use of solar, wind, wave, and hand energy are briefly considered and examples of existing uses are given Factors to be considered in gathering data, making potential cost estimates, and selecting processes, particularly in developing countries, are examined. Appendices include a selected

list of U.S. desalination equipment manufacturers, worksheets and cost curves to assist in cost-estimating, guidelines for desalting process selection, a glossary of terms, and a 196-item bibliography (1946–80).

AID/otr-C-1618 936250200

Paper copy $60.19 Microfiche $5.40

129 PN-AAJ-170

KOREAN POTABLE WATER SYSTEM PROJECT: LESSONS FROM EXPERIENCE

Chetwynd, E.; Dworkin, D.; Kim, S.U.
A.I.D., Bureau for Program and Policy Coordination, Office of Evaluation.
1981, 69 p.

A.I.D. Project Impact Evaluation Report No. 20

To address the potable water needs of semiurban communities (population 5,000–10,000) overlooked by rural and urban development projects, A.I.D. joined CARE in 1977 to sponsor a piped water system (PWS) project for six South Korean communities. This report, based on interviews with PWS operators and users, evaluates the project's impact and lessons for the future. The project was generally unsuccessful, failing to achieve any of its objectives completely. Only four of six targeted PWS's were fully operational by project completion date (1979) and two of these were technically deficient, failing to treat water sufficiently or to locate adequate water sources. In addition, only one village committee had been formed to operate their PWS system; the public education program was poorly conceived and managed; a lack of baseline data made it impossible to measure the project's impact on community health; and a user requirement to pay for connections and meters put the system beyond the reach of many poor households. There was also an indirect negative effect: runoff from flush toilets (the installation of which the project facilitated) created a potential for transmitting waterborne diseases. The project's major shortcoming, however, was that its design lacked any features allowing it to be replicated nationally or even regionally. On the positive side, the project did save time and make life easier for users, especially women. Chief lessons learned and accepted by the Government of Korea were that PWS project priority need not necessarily go to the poorest towns since these often experience shrinking populations and prefer traditional water sources; PWS's should be accessible to the poor while avoiding subsidization; project design should entail a regional or national focus to serve as a model; and environmental assessments should accompany all PWS's. Using identical data but focusing on the piped-water supply throughout all of Korea, an attached second evaluation recommends, among other things, servicing urban industrial and polluted rural areas before those with traditional, but sanitary water supplies. Other recommendations are included in the appendices.

AID/asia-G-11-98

Paper copy $8.97 Microfiche $1.08

130 PN-AAH-478

THE TRANSFER OF TECHNOLOGY TO WATER SUPPLY, SANITATION, AND WASTE DISPOSAL SYSTEMS IN DEVELOPING COUNTRIES

Urban Resources Consultants, Inc.
1979, 114 p.

Companion report: PN-AAH-477, 128 p.

More than half the world's people have no reliable and safe water supply, while 70–80% have no sewage disposal. To help decisionmakers develop feasible options to improve these dreadful conditions, which are responsible for 80% of all illnesses in the Third World and are the major cause of infant mortality, this paper, one of a series of state-of-the-art reports, reviews the possibilities for improving developing country water supply, sanitation, and waste disposal (WS/S/WD) systems through the transfer of technology. A World Bank study on low-cost technology options for WS/S/WD systems reveals that a majority of research reports are of no practical value to developing countries because they focus on developed country technologies inapplicable to developing country situations, e.g., septic tanks and sewage treatment instead of pit latrines and stabilization ponds. It is concluded that differences in climate, socioeconomic conditions, and magnitude of the problem make appropriate technology transfer from industrial to developing countries difficult. WS/S/WD customs and practices in developing countries are reviewed to provide a general perspective for appropriate technology transfer. Also outlined are governmental program options, technical and planning considerations, and capitalization requirements for the design and adoption of appropriate WS/S/WD technology. The study found that few developing countries have adequate water policies, especially for rural areas; that local participation, and especially knowledge of local customs and beliefs, is essential to any improvement in WS/S/WD systems; that improvements can be made in assessing water supplies, conserving their use, and influencing their distribution; and that appropriate technology need not be capital-intensive. The study also found that certain U.S. technologies could be directly transferred to developing countries given appropriate host country administrative structures to assure proper maintenance and operation. Included are a detailed program for planning a village water supply program, guidelines for evaluating technology options, excerpts from a Guatemalan case study, and a 300-item reference list (1921–78).

AID/otr-C-0015

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131 PN-AAJ-564

INTERNATIONAL COOPERATION IN MARINE TECHNOLOGY, SCIENCE, AND FISHERIES: THE FUTURE U.S. ROLE IN DEVELOPMENT: PROCEEDINGS OF A WORKSHOP, JANUARY 18-22, 1981, SCRIPPS INSTITUTION OF OCEANOGRAPHY, LA JOLLA, CALIFORNIA

National Research Council, Commission on International Relations.
1981, 408 p.

To help both developed and developing countries explore the vast economic and scientific potential of the world's oceans, A.I.D. sponsored an international workshop in 1981 on the need for international cooperation in the fields of marine technology, science, and fisheries, with emphasis on the future role of the United States in these fields. Papers were prepared on marine resources for each major region of the developing world (Africa, Latin America/Caribbean, Southeast Asia/Oceania, and the Near East/India) as well as on the following topics: federal support for marine technical assistance and related activities; the future of ocean science and marine technical cooperation; current developing country needs and programs; non-U.S. donor programs; and other possible avenues of technical assistance. Priority needs identified in the regional reports include assisting developing countries to learn the extent of their marine resources through analysis of currently available information and from detailed surveys of marine resources within their 200-mile economic zones; increasing the number of local scientists, engineers, and technicians; establishing regional training centers and research facilities; including economists and social scientists in marine-related projects; providing technical assistance according to priorities set by the host countries; promoting regional coordination of marine-related research and the dissemination of findings; encouraging links between public and private sectors; including mechanisms for ongoing supervision and evaluation of projects; and promoting future scientific leadership by encouraging the participation of younger scientists. Recommendations directed to U.S. agencies include estabishing a U.S. Government-based information clearinghouse on marine technical assistance; encouraging cooperation between U.S. and developing country scientists; promoting greater flexibility and continuity of funding for assistance projects; increasing emphasis on fisheries and marine science in U.S. foreign aid programs; and addressing the language constraints of non-English speaking personnel and students. Many of the papers include bibliographies. A list of workshop participants is included.

AID/DSAN-G-0168 931115500

Paper copy $53.04 Microfiche $5.40

132 PN-AAH-946

RENEWABLE ENERGY IN EGYPT: AN ANALYSIS OF OPTIONS

Mitre Corporation.
1980, 285 p.

Analysis by AID/NE/TECH published separately: PN-AAH-945, 25 p.

Development of Egypt's renewable energy (RE) resources can help alleviate the country's balance of payments deficit by freeing additional petroleum for export; provide employment through development of local manufacturing facilities for RE resources; and allow dung and agricultural residues, now burned as fuel, to be used for soil conditioning and fertilizing. This paper reports the findings of a USAID-sponsored study to analyze the options for the use of RE resources in furthering Egypt's economic development and to suggest strategies for USAID/E assistance in the next 5–10 years. The basic unit of study was a combination of RE resource, technology, and end-use. Through preliminary analysis of 22 such combinations, the following six areas were identified as having outstanding potential for program development: solar water heating for industrial process heat and for agricultural, institutional, and domestic applications; solar crop and food drying; rural biogas digesters; wind machines for irrigation, electric generation, and perhaps desalination; solar refrigeration and cooling; and photovoltaic remote applications. Each of these areas is analyzed in greater detail (technology used and relative costs; utilization potential; social, environmental, and economic impacts; and infrastructure needed), and recommendations for programs and USAID/E support are presented. The other energy options considered in the preliminary analysis are briefly discussed as having good or limited potential or as needing further study. An appendix contains details of the information gathered and the analyses performed for the resource/technology/end-use combinations that were considered, including reasons why some combinations were not selected for detailed analysis. Other appendices describe the economic analysis methodology, give the criteria used for evaluating energy options, and analyze Egyptian energy-related agencies in terms of their institutional capabilities and their potential roles in recommended programs. A 31-item list of references (1974–79) is included.

AID/SOD/PDC-C-0146 263010600

Paper copy $37.05 Microfiche $3.24

133 PN-AAJ-101

ASSISTANCE TO THE THIRD WORLD ON URBAN ENERGY

Howe, J.W.; Tarrant, J.J.
Overseas Development Council.
1980, 191 p.

Since increased urbanization usually entails increased energy use, the 5-10% growth rate of developing country urban areas has ominous implications for these countries' future energy needs. This report assesses major urban energy uses and problems and recommends strategies and a methodology for A.I.D. assistance in helping to meet these needs. An analysis of energy use by sector indicates that in general, industry consumes far more commercial energy in developing countries than in developed countries. In the service sector (i.e., retail trade shops, government activities, utilities), developing countries' energy costs are higher due to these countries' limited infrastructure. Within the informal sector (those individual or group enterprises which are loosely characterized by high labor and low capital intensity, irregular hours, erratic work

conditions, and high labor mobility), human labor substitutes for commercial energy sources and capital requirements, while in the household sector, one-fourth of family budgets are spent on heat-related, energy-using tasks, such as cooking, heating, and lighting. Within both the construction and transportation sectors, more labor-intensive, energy-saving technologies could be employed to replace the developed country, energy-monger methods currently in use. A major barrier to designing effective energy-saving policies is the lack of comprehensive data on patterns of energy use, efficiencies of conversion, matching of fuel to end-use, and environmental and social costs of energy use patterns. Development agencies should assist developing countries in exploring for fossil fuels and in developing hydroelectric and solar facilities. In devising an urban energy assistance program, the authors recommend that emphasis be placed on: (1) collecting data specific to the target area and disseminating those data to proper local officials; (2) improving local energy capabilities by institution building, training, and increasing public awareness; and (3) financing urban energy activities.

AID/DSAN-G-0142 931000300

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134 PN-AAJ-209

AFRICA ENERGY SURVEY METHODOLOGY; VOLUME 1

Donovan, Hamester, & Rattien, Inc.
1979, 117 p.

Volume 2, Appendix II, Data Base, published separately: PN-AAJ-210, 139 p.

With the availability of energy a major determinant in Africa for economic growth and the equitable distribution of its benefits, most African energy planners are constantly on the look-out for new and more efficient energy use systems. This report provides a methodology to be used by African energy planners in assessing energy resources, uses, and suitable conversion technologies based on the specific needs of individual African nations. The critical issues addressed include: (1) assessing the purpose for collecting and analyzing energy-related data (three major planning considerations are covered—national energy accounts and environmental considerations, allocation and use of resources, and project analysis and choice of techniques); (2) determining what specific data are required (a wide range of possible data elements is outlined by category and class to support information needs); (3) deciding how to collect chosen data (this section addresses the crucial elements of proper research design and helps determine specific survey requirements, including the use of local technical and social research expertise); and (4) finding ways to use data. Four analytical processes for using the data are described, including two techniques for establishing overall country future energy resource requirements: (1) a Reference Energy System composed of energy source, process, and end-use; and (2) Linear Projection for forecasting future demand. Two other techniques address methods for selecting candidate energy conversion techniques appropriate to specific development programs. The first, the Socio-Cultural-Feasibility Study, is a qualitative assessment of local conditions affecting various techniques. The second, the Cost/Benefit Analysis, is a quantitative measure of the financial and economic feasibility of each technique. Application of the latter two techniques is demonstrated in a lengthy, appended case study of a potential fish drying project in a maritime artisanal fishing village in Senegal. A number of suitable technologies for the project are subjected to both types of analysis and it is concluded that the solar cabinet dryer should be field tested. A total of 20 references (1967–79) are appended and a case study of fish drying in Senegal is included.

AID/SOD/PDC-C-0147 698013500

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135 PN-AAJ-210

AFRICA ENERGY SURVEY METHODOLOGY; VOLUME 2: APPENDIX II, DATA BASE

Donovan, Hamester, & Rattien, Inc.
1979, 139 p.

Volume 1, Main Report, published separately: PN-AAJ-209, 117 p.

Appended to a separately published report outlining a methodology for surveying Africa's energy needs and suitable energy technologies, this volume, divided into eight sections, provides a structure for obtaining an energy data base. Each section is divided into a general or background series of questions followed by a set of questions suitable for macroanalysis; both multiple-response and narrative-response formats are used. Section one, "To Measure Household and Village Demographic, Economic, Climatic, and Political Indicators," includes household size; age and sex distribution; and economic, religious, and ethnic information. Questions about villages cover size, location, geography, economics, education, and trends. The second section, "To Identify and Quantify Household Energy Consumption Patterns (Rural and Urban)," covers energy consumption patterns relating to cooking and water heating, lighting, cooling, water transportation and lifting, food grinding, and household appliance fuels and use patterns. The third section, "To Identify and Quantify Village Energy Resources," covers factors such as commercial energy sources, ownership, distribution, location, development plans, prices, and trends. Fuels considered range from dung and firewood to electricity and petroleum products. The fourth section, "To Measure Energy Consumption in Industry," includes the following elements: labor input, manufacturing processes and production, and the type of fuel consumed. The fifth section, "To Measure Energy Consumption in Agriculture," covers crops and crop patterns, labor and equipment requirements, fertilizers, irrigation, and crop processing. Elements covered in the sixth section, "To Measure Energy Consumption in Agriculture," include private and public vehicles and facilities; travel and

transportation requirements and variables; and road, rail, water, and air resources. The seventh section, "To Measure Energy Consumption in Commercial and Government Buildings and Vehicles," treats commercial (retail, hotel, etc.) and government requirements and practices. The final section, "To Identify Social and Cultural Relationships Associated with Energy Consumption/Supply Patterns," deals with the division of labor, time requirements, responsibilities, consumer preferences, and perceived needs.

AID/SOD/PDC-C-0147 6980135000

Paper copy $18.07 Microfiche $2.16

136 **PN-AAJ-566**

PYROLYSIS OF RICE HUSKS IN INDONESIA: INTERIM REPORT

Tatom, J.W.; Wellborn, H.W.
Development Technology Center.
1980, 60 p.

Because developing countries are in desperate need of renewable, low-cost energy, efforts have recently been undertaken to develop labor-intensive means of converting biomass into synthetic fuels. This report describes an ongoing USAID/Indonesia project to develop economical pyrolysis technology and design the equipment needed to utilize pyrolytic outputs and byproducts to meet the energy needs of rural Indonesia. The report includes a description of the convertor's basic design, an extensive review of previous and current work, an economic analysis of the convertor, an evaluation of program objectives and strategy in light of experience to date, and a list of future activities. The pyrolytic convertor being designed is capable each day of transforming one ton of dry, pulverized feed (rice husks in the Indonesian case) into char through extensive heat application and oxidation. Based on previous U.S. and industrial world experience, the convertor's design is currently being modified to avoid particulate accumulation in the off-gas, to maintain proper material flow within the convertor to avoid bridging problems, and to maintain a fixed bed depth to ensure uniform off-gas temperature. Since, in addition to the char, conversion byproducts such as carbon monoxide and oil vapor can be harnessed for both onsite and offsite use, a charcoal briqueting system, an off-gas burner for crop drying, and oil utilization equipment have been developed. Economic analysis of the project reveals that return on investment is sufficiently attractive to warrant widespread adoption of rice convertors for fuel production. Based on preliminary reviews, the authors recommend a revised strategy focusing on char utilization for domestic fuel purposes, onsite gas utilization to power diesel engines; using oils as wood preservatives or industrial bunker fuels; and slightly increasing mechanization of the overall pyrolysis system for greater efficiency. Future project endeavors include upgrading convertor throughput, improving briquet production techniques, perfecting the use of off-gases for diesel and spark ignition engine operation, investigating alternative uses for oils, and beginning design work on further system mechanization. An 11-item bibliography (1976–80) is appended.

AID/497-79-100.33-T 497026800

Paper copy $7.80 Microfiche $1.08

137 **PN-AAJ-629**

THE POTENTIAL FOR RENEWABLE ENERGY TECHNOLOGIES IN THE RURAL POSTHARVEST FOOD SYSTEM IN DEVELOPING COUNTRIES

Lindblad, C.J.
1981, 98 p.

The finite supply and escalating price of oil make the development and promotion of renewable energy technologies a priority for developing countries. This report examines energy demand and potential renewable energy technologies for postharvest food processing with particular emphasis on technologies related to grain. Postharvest activities (harvesting, drying, threshing, winnowing, shelling, hulling, grinding, storage, refrigeration, canning, cooking) and the techniques used in these activities are explored. Possible renewable sources include fuelwood, charcoal, solar cookers, ovens, and crop dryers, photovoltaics, animal draft, pedal power, wind power, hydropower, biogas, and alcohol fuels; some of these, it is noted, also have potential applicability beyond postharvest activities. The report recommends that: (1) implementation trials be conducted to gauge user receptivity to new technologies and assess the practicality of the new technologies in terms of local priorities, customs, and resources; (2) development and promotion programs be established for those technologies with the greatest near-term potential—fuelwood production, efficient cookstoves, small-scale water resources, and wind resources exploited for mechanical and electrical power; (3) low-cost technologies be developed and made available at affordable prices to farm families; (4) attempts be made to assure that women's incomes and role in postharvest activities do not erode in the face of technical advances; and (5) national renewable energy research and development centers be established to provide energy surveys, locally adapted technologies, training, local language manuals, and technical assistance in the design and implementation of technology promotion efforts. The report concludes that even though the acceptance of such promising new technologies as solar crop drying, animal power, pedal power, biogas digesters, and organic insect control will take time and that the short-term effect of renewable energy technologies will probably not be great, these technologies can still have a significant long-term impact. A 116-item bibliography (1960–81) is appended

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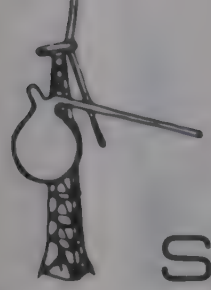

SCIENCE & TECHNOLOGY

138 **PN-AAJ-771**

WOOD FUEL USE IN PAPUA NEW GUINEA; AN ASSESSMENT OF INDUSTRIAL COMBUSTION EQUIPMENT

Mendis, M.S.
Mitre Corporation.
1980, 242 p.

Sponsored by A.I.D. and the U.S. Department of Energy, Pittsburgh Energy Technology Center

In Papua New Guinea (PNG), where 75% of industrial energy needs are supplied by petroleum and fossil fuel reserves are unknown, the rapidly rising price of petroleum imports threatens industrial growth. To aid government efforts to encourage use of wood products, this report assesses the engineering and economic feasibility of new and retrofit wood fuel industrial combustion equipment. Existing combustion equipment in PNG is relatively small-size, generally overdesigned, and not fully efficient. By comparing such existing equipment and its use with commercially available, state-of-the-art industrial wood fuel systems, the following technologies were selected as most promising for local use: pyrolytic oil and oil-petroleum mixture combustion, lump/crushed charcoal combustion, hogged/chipped wood combustion or gasification, crushed charcoal gasification, and pulverized charcoal-oil mixture combustion. All these technologies are compatible with equipment currently existing in PNG and make centralized use of raw wood and wood wastes through direct combustion or gas conversion. In 11 case studies representing a cross-section of PNG industrial fuel systems, each technology was analyzed in terms of its net present value (NPV) savings over the existing petroleum-fueled system. The report concludes that industrial wood fuel use, especially using a pyrolytic oil system, is attractive for high-use industries and generally has a positive NPV over petroleum-fueled systems. The report recommends that the PNG government: (1) encourage use of wood, pyrolytic oils, and charcoal as industrial fuels when purchasing new equipment, and promote wood and pyrolytic retrofits for existing, heavily used, and well-maintained equipment; (2) establish guidelines for standardizing new wood fuel technologies; (3) offer financial or tax assistance to aid small industry in implementing the new technologies; (4) assist in making existing equipment more fuel-efficient; and (5) encourage development of wind, solar, and other alternative renewable energy technologies. Appended are a 19-item bibliography (1973–80), a discussion of wood conversion technologies, a list of equipment suppliers and manufacturers, and the NPV equations and FORTRAN program.

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Paper copy $31.46 Microfiche $3.24

139 **PN-AAJ-807**

ENERGY IN THE FOOD SYSTEM; DOMINICAN REPUBLIC

Daines, S; LeBaron, A.; Posner, L.; Hancock, K.; Buttars, R.; McGranahan, G.; Mitchell, G.; Mubayi, V.; Stern, R.
Practical Concepts, Inc.; Brookhaven National Laboratory.
1980, 235 p.

This intensive study of fossil energy use in the Dominican Republic's (DR) food system reveals that the system's energy bill for non-sugarcane products can be reduced as much as 4% by the year 2000. After reviewing DR food system components, the authors estimate energy use and its efficiency at each food-chain link (production, processing, marketing, storage, and transportation) for traditional DR agricultural products; make a series of short-and medium-term energy use projections; and explore policy alternatives for product, technology, and energy use adjustments. Sugar cane production and processing is the greatest and most inefficient energy user, employing high technology to consume nearly 75% of all DR fossil fuel energy at the farm level, while contributing only 23% of the total value of agricultural production. Because sugarcane requires separate treatment, however, no energy-saving options are presented in its regard. Other agricultural products also absorb relatively large amounts of fossil fuel energy, but these have a good domestic (beef) or foreign (tobacco, coffee) market that would be difficult to curtail. Only a limited number of products, outside of sugarcane, offer potential for reducing fossil fuel energy consumption. The most likely of these are banana, plantain, poultry, cocoa, and especially rice, the only one of these products currently using a relatively high technology and energy use level. Policy options to reduce energy use in the food system or increase its efficiency within income constraints or nutritional requirements fall into three categories: (1) change the mix of products produced or consumed; (2) alter cultivation techniques; and (3) alter food processing and handling technology. Cocoa, poultry, and unprocessed pork are good crop substitutes because, as potential export products which employ minimal amounts of fossil fuel energy, they could earn foreign exchange and save imported fossil fuel energy. Shifting production of rice, milk/beef, and peanuts to geographical zones where simpler technologies are used, could save 10–13% of fossil fuel energy. Appendices include a 97-item bibliography (1960–80) in English and Spanish.

Paper copy $30.55 Microfiche $3.24

140 **PN-AAJ-489**

BIOMASS FOR ENERGY IN ECUADOR: AN ASSESSMENT

Beinhart, G.; Henry, J.F.
United States Department of Agriculture, Forest Service/ Science and Education Administration Bioresources Team.
1981, 99 p.

Burgeoning population growth in Ecuador contributes to increased use of fuelwood and the consequent over-exploitation and degradation of Ecuadorean forests and ecosystems. This paper surveys the country's existing biomass resources and considers new approaches to its production and use. The Instituto Nacional de Energia (INE) needs to encourage greater wood production (woodlots, multipurpose forests) and improve fuelwood efficiency through the introduction of more efficient wood burning stoves. Although alternative fuel sources are plentiful in Ecuador, their feasibility will depend upon relative costs (monetary, convenience, and effectiveness). Crop residues of bagasse, rice, cocoa hulls, and other residues available at agroindustry plants may be compressed through direct combustion, gasification, pyrolysis, or fermentation and converted into energy. Excess bagasse alone could satisfy the solid fuel needs of about 20,000 people yearly, indicating the importance of investigating this economical alternative. Although the use of crops for energy without reducing food production is possible in Ecuador, it is not economically feasible in the immediate future. Total costs of production, harvesting, processing, and transporting, are higher than the market value of crude biomass as a solid fuel. Other long-term options for the INE are municipal wastes that can be processed into refuse-derived fuel (RDF) or burned to produce steam and electricity for industrial and municipal applications. RDF pellets, a solid fuel, would be half the price of fuelwood and would also be competitive in a gaseous form for oil-fueled boiler systems. Biogas production from animal manure and municipal sewage can be used for fuel in rural homes and small industries. The INE is operating seven demonstration biogas generators in different areas to investigate the reliability and economic feasibility of biogas for rural families. The study recommends that continued surveys be undertaken by INE and A.I.D. on the use of fuel wood substitutes and the probable future of biogas. Nine appendices on contacts, trips, and energy consumption and a list of 25 references (1974–80) are included.

Paper copy $12.87 Microfiche $2.16

141 **PN-AAH-729**

FIELD REPORT: AN ASSESSMENT OF TRANSPORT INFRASTRUCTURE RELATIVE TO ZAMBIAN COASTAL LINKAGE

Moeller, P.W.
1980, 226 p.

The major constraint to Zambia's economic development—its inadequate transport system—is rooted in the politically unstable atmosphere surrounding this landlocked nation and in the poor condition of the transport infrastructure itself. This field report reviews Zambia's transport system in terms of Zambia's import/export traffic through the southern African nations on which Zambia depends. An overview of foreign railway systems connected to those of Zambia reveals poor track conditions and a shortage of high-powered locomotives, equipment, and manpower, as well as problems resulting from the closure of the Rhodesian border between 1971–79 and of ports due to guerilla activities. Regarding cargo transport by road, it is found that although trucks can easily respond to demands for heavier loads, haulage by truck is more costly than by railway and depends upon imported petrol. Assessments of major roads and port facilities reveal that primary roads, extensively damaged by heavy rains in the 1970's have been adequately restored (although the same cannot be said of secondary roads); and that port facilities are deficient in warehouse and handling equipment. Also discussed are Zambia's deficit in maize supplies, due to road and bridge destruction, and the amount of imported maize needed to cover this deficit; constraints to its transport; and strategies to remove the latter. The impact on Zambia's transport system from the reopening of Rhodesia's border would mean a return to a client-state status between the two countries which, in spite of the constant threat of political instability, would significantly increase the flow of commodities to Zambia. Recommendations for A.I.D. assistance to Zambia include identifying key problems—specifically, maximization of existing infrastructure, with emphasis on inputs of cargo and grain storage equipment and of maintenance and management skills—and providing a framework for solving these problems. Priority targets for A.I.D. assistance are specified. Concluding the report are a 12-item bibliography (1977–79) and appendices on other donor activity, bridge and port status and field trip reports, and Zambia/Mozambique route options.

AID/611-002-T 698013500

Paper copy $29.38 Microfiche $2.16

142 **PN-AAJ-415**

SYRIAN ARAB REPUBLIC COMPREHENSIVE TRANSPORT STUDY: FINAL REPORT, VOLUME I: EXECUTIVE SUMMARY

Louis Berger International, Inc.; Tippetts-Abbett-McCarthy-Stratton.
1981, 59 p.

Study includes volumes 1-7: PN-AAJ-415 through PN-AAJ-421

Syria has in place or is constructing all the infrastructure needed for an adequately functioning transport sector until the year 2000. So concludes this executive summary, the first of a seven-volume study of the Syrian transport sector. The report recommends actions to the Government of Syria (GOS) in each of the key sectors discussed in this series. In regard to transportation management, the GOS should reorganize the

Ministry of Transport to clarify its responsibilities and those of its subordinate agencies and should solicit external advisory services to improve operations and develop training programs. Road transport recommendations include recentralizing resposibility for road planning, construction, and maintenance in the Ministry of Communications; reducing the rate of road construction; developing new road design standards and pavement design testing methods; and initiating a plan of pavement widening and resurfacing during the present 5-year plan. Among the rail transport recommendations are developing a major 2-year technical assistance program with a consulting subsidiary of a railway operating on European UIC standards and reorganizing the rail management board to include representatives of all pertinent ministries and interests involved in transportation. Regarding ports, the GOS should enforce unitized cargoes as much as possible and immediately acquire 45,000 wooden pallets. To improve aviation, the GOS is advised to purchase new, more efficient aircraft to replace aging or obsolete models. Other transport sectors covered in the assessment are pipelines, storage facilities, and transportation personnel training. A final section presents preliminary investment recommendations based on a strictly economic comparison of alternative scenarios projecting the transport sector's requirements from 1980 to 2000.

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143 **PN-AAJ-416**

SYRIAN ARAB REPUBLIC COMPREHENSIVE TRANSPORT STUDY: FINAL REPORT, VOLUME II: TRANSPORT DEMAND

Louis Berger International, Inc.; Tippets-Abbett-McCarthy-Stratton.
1981, 190 p.

Study includes volumes 1-7: PN-AAJ-415 through PN-AAJ-421

Despite the strains on the Syrian transportation network caused by an increasing population and an often forbidding topography, this report predicts that Syria's aggregate demand for transport will not outstrip supply through the year 2000. This report, the second of a seven volume study on the Syrian transport sector, analyzes, against a background of demographic and economic data, demands placed on the Syrian transport system by domestic freight, transit, passenger, and tourist traffic. Domestic freight traffic was disaggregated into 51 commodity groups and then combined into three categories of similar per ton-kilometer cost characteristics to predict increases in freight flows on the major transport corridors. Shipped freight tonnage will thus increase 2.5% per year from 1979 to 1985 and 4.4% annually from 1986 to 2000. These low growth rates are primarily due to stagnant pipeline transport of crude oil. Anticipating future transit traffic (goods shipped through Syria to another country) is difficult because political changes in the Mideast make the use of Syrian intermediate transit uncertain, but assuming that economic factors prevail and that Syria's geographic position is exploited by those shipping goods to and from Europe, and excluding the pipeline sector, annual tonnage growth rates of 9% for 1979 to 1985 and 5% for 1986 to 2000 may be expected. Domestic demand for passenger traffic is met almost entirely by automobiles, buses, and other transport exclusive of air and rail due to the former's high price and the latter's restricted availability. In fact, rail accounts for only 3.1% of the total passenger-kilometers travelled and air for only 0.4% as of 1979. To ease the expected 53% increase in passenger demand by 1985, the rail system will increase its share of passenger-kilometers to 12% by 1985. To help reduce burgeoning passenger traffic demand (expected to be three times its 1979 level by the year 2000) Syria should adopt a cost-effective, non-subsidized pricing policy for mass transit. Finally, although Syria seeks to expand its tourist traffic by increasing the number of transit beds from 18,500 to 35,000, the Central Bureau of Statistics' practice of designating all visitors to Syria as tourists may make these plans overly optimistic.

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144 **PN-AAJ-417**

SYRIAN ARAB REPUBLIC COMPREHENSIVE TRANSPORT STUDY; FINAL REPORT, VOLUME III: RAILWAYS

Louis Berger International, Inc.; Tippetts-Abbett-McCarthy-Stratton.
1979, 226 p.

Study includes volumes 1-7: PN-AAJ-415 through PN-AAJ-421

Syria has embarked upon an ambitious expansion of its rail system which, by 1985, will adequately meet national rail transport demand through the year 2000. So concludes this, the third of a seven-volume study on the Syrian transport sector. The study analyzes both of Syria's rail lines, the Chemin-de-fer Syrien (CFS) and the Chemin-de-fer Hijaz (CFH). The CFS, a standard gauge (1,435 mm) railway serving both north-south and east-west traffic, is the largest and most important railway in Syria. By 1985, CFS will have achieved annual increases of 6 million passengers and 5 million tons of freight. Although new lines will go from Mhine to Damascus and from Deir Ez to Albu Kamal, CFS will have to anticipate capacity problems requiring doubletracking on the Damascus-Homs line in the 1990's. Further, to run the newly expanded CFS network efficiently, a major personnel training and assistance program should be initiated and managerial positions created to deal with finance, law, administration, planning, marketing, engineering, and liaison with ports. Existing rolling stock should be better utilized, but even with total utilization, equipment will need to be supplemented with an additional 184 main line locomotives, 65 shunting locomotives, 843 coaches, and 7,540 freight wagons by the year 2000. Passenger tariffs are presently well below the marginal cost of running the CFS efficiently and should be raised to meet operating costs. The CFH is Syria's narrow

gauge (1,050 mm) rail network which in the past depended for its livelihood on the transport of passengers and freight from east to west. When its last access to the Mediterranean was cut off at the Lebanese border in 1976, CFH suffered an irreversible depression. Despite dieselization and added rolling stock, CFH is generally not competitive with other forms of overland traffic and a closure of its Damascus-Dera'a line appears inevitable. More importantly, Syria is conducting a feasibility study to determine the utility of replacing CFH with a standard gauge line. Thus, the above recommendations are of an interim nature and mostly concern maintaining the line until its final disposition is determined.

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145 PN-AAJ-418

SYRIAN ARAB REPUBLIC COMPREHENSIVE TRANSPORT STUDY: FINAL REPORT, VOLUME IV: ROADS AND ROAD TRANSPORT

Louis Berger International Inc.; Tippetts-Abbett-McCarthy-Stratton.
1981, 333 p.

Study includes volumes 1-7: PN-AAJ-415 through PN-AAJ-421

Syria's roads are unlikely to accomodate traffic increases projected to the year 2000 without significant modifications. So concludes this study of Syria's road system, the fourth of a seven-volume study of Syria's transport sector. The current road system is a mixture of deficiency and overdevelopment. Notable portions of both paved and unpaved rural roads are of a quality either too high or too low for their current traffic, and road conditions are deteriorating on 83% and 95.5% of these roads respectively. Based on the least-cost alternative system of investment evaluation, the study concludes that the proposed highway betterment program will yield high economic benefits—even though the rail system is more efficient than the road system—and that a marginal cost pricing policy for passenger transport would substantially reduce total system costs by 2000. Also provided are a list of investment priorities under the 1981–85 development plan (including the purchase of 90,000 new or replacement vehicles), additional priorities for the period 1986–2000, and an estimate of income from road user charges. In other areas, it is recommended that the feasibility of returning to a crushed granular aggregate base course in road design be studied; that the rules governing road inspection be clarified to end violations of Syrian construction standards; and that maintenance be improved by establishing a Mohafaza-level model road maintenance/production unit and by increasing national government administrative and technical support. The vehicle scrapping rate should also be established to determine the actual number and age of the cars in use, and statistics collected on cars (domestic and imported) and on vehicle operating costs. A method for determining the latter is provided. Decentralizing the responsibilities formerly concentrated in the Ministry of Communications (MOC) has created serious gaps and conflicts in road construction, maintenance, and budgeting. To address these problems and ensure proper technical guidance is provided to primary and local road units, the study recommends recentralizing all road responsibilties under the MOC with the Mohafazas and the Ministry of Local Administration participating in the budget and planning processes.

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146 PN-AAJ-419

SYRIAN ARAB REPUBLIC COMPREHENSIVE TRANSPORT STUDY: FINAL REPORT, VOLUME V: PORTS AND SHIPPING

Louis Berger International Inc.; Tippetts-Abbett-McCarthy-Stratton.
1981, 274 p.

Study includes volumes 1-7; PN-AAJ-415 through PN-AAJ-421

Syria's planned expansion of the ports of Tartous and Lattakia will provide the nation with sufficient port capacity through the year 2000. So concludes this report on ports and shipping, the fifth of a seven-volume study of Syria's transport sector. However, the report's underlying assumption of an average one-shift per day loading rate is only possible if at both ports Syria: (1) implements a new, graduated tariff regime; (2) institutes unitized cargo handling; (3) improves coordination of road and rail transport to and from the ports; (4) improves the use of storage facilities and customs clearance procedures; and (5) develops a manpower training program. While Lattakia and Tartous share common problems, differences in the age and size of the ports require separate analyses. Although Lattakia's physical plant is basically sound, port efficiency is directly impeded by inadequate equipment to repair cargo handling machinery; the unavailability of spare parts due to their foreign origin or the obsolescence of port machinery; operational slowdowns caused by rapid changes in cargo handling requirements; and the unavailability and poor coordination of land transport to and from the port. To expedite cargo handling, Lattakia should acquire 25,000 new pallets as soon as possible and anticipate rail and road congestion in its expansion plans. The port at Tartous is new and in good condition, enjoys wide aprons between ships and transit sheds, and has equipment that is adequate and in good working order. The port's rapid growth has, however, led to interruptions in cargo handling due to dirt from construction which irritates workers and necessitates frequent machinery repairs, and haphazard storage of building materials and enforcement of safety requirements. Immediate recommendations are to contain dust from the phosphate conveyor and ship loading systems, acquire road cleaning machinery, and purchase 20,000 pallets as soon as possible for expeditious cargo movement. To rejuvenate its 40-ship merchant fleet, which is at the end of its economic life, Syria

should build 35 new ships by the year 2000 and initiate a merchant marine training program.

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SYRIAN ARAB REPUBLIC COMPREHENSIVE TRANSPORT STUDY: FINAL REPORT, VOLUME VI: OTHER MODES AND RELATED INDUSTRIES

Louis Berger International, Inc.; Tippetts-Abbett-McCarthy-Stratton.
1981, 292 p.

Study includes volumes 1-7: PN-AAJ-415 through PN-AAJ-421

Syria's efforts to meet its transport needs through the year 2000 are succeeding even in such disparate subsectors as aviation, pipelines, construction, and storage. So concludes this fifth of a seven-volume report on Syria's transport sector. Syria easily meets current air travel demand with four domestic airports and an international airport at Damascus, with a second planned for Aleppo. The most urgent requirement in civil aviation is to revise the master plans of all these airports to eliminate obsolete or inefficient physical plants. Also needed are improved training programs for paraprofessional and lower-level personnel from Syrianair and the Directorate General for Civil Aviation. Syria should modernize its air navigation system by establishing a regional traffic control center in concert with its Arab neighbors and by straightening out flight routes wherever possible. Syrianair should also refurbish its fleet with 727's and F-27's for use on international and domestic routes, respectively. Three public corporations are responsible for Syria's internal and external oil pipeline system and for domestic storage and marketing. All pipelines have ample capacity and maintenance is adequate. Feasibility studies should be conducted for pipelines between Homs, Al Raqqa, and Aleppo, and for new distribution centers at Damascus and Dera'a. Although Syria's construction sector cannot be analyzed fully due to the government's reluctance to provide vital industry statistics, available information indicates this sector will grow by an average of 7% per year from 1979 to 2000 and is capable of undertaking all building programs currently envisioned. Competitive bidding would make this sector healthier and more viable by equitably dividing contracts between the dominant public companies and private ones. Existing and planned storage capacity will be adequate, since present facilities can increase storage efficiency up to 100% by improving record-keeping systems needed for forecasting and by better managing present capacity.

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SYRIAN ARAB REPUBLIC COMPREHENSIVE TRANSPORT STUDY: FINAL REPORT; VOLUME VII: TRANSPORT SECTOR PLANS

Louis Berger International, Inc.; Tippetts-Abbett-McCarthy-Stratton.
1981, 224 p.

Study includes volumes 1-7: PN-AAJ-415 through PN-AAJ-421

Using the Syrian Transport Analysis System (SYRTRANS), a computerized management information system, this report, the last of a seven-volume study on the Syrian transportation sector, assesses prospects and plans for the sector as a whole. Because data on Syria's transport sector have gaps, are inconsistent, and are poorly managed, the consultants developed SYRTRANS for the Government of Syria (GOS). SYRTRANS' structure (including individual data banks) and methods are described along with its major uses—predicting the quantity and type of traffic each subsector can accommodate, seeking ways to reduce costs and optimize facility use, and analyzing modal split (i.e., the use of one transit mode over another equally accessible mode). Assuming that market conditions regulate modal split, from 1979 to 1985 the most striking movement will be the increased use of the expanding rail system. From 1985–2000, rail will carry the majority of bulk freight (cereals, phosphates, cement) while road transport will accommodate more perishable and expensive goods such as food, fertilizer, and captial equipment. The most notable modal shift will occur within the road subsector where passenger cars will double by the year 2000, reducing the importance of pickup trucks and where increased bus service will supplant the importance of intercity taxis. Regardless of modal split, however, marginal cost pricing of tariffs is recommended since it will cause no distortion of economic or social activities due to artificial prices. Organizationally, the GOS should reserve all intermodal planning to the Supreme Planning Council, clarify the responsibilities of the Ministry of Transport, and initiate a manpower study to identify personnel needs to end labor shortages throughout the sector. Regarding the current 5-year plan (1981–85), the consultants recommend the following order of investment priorities: committed projects (accounting for 73% of expenditures); equipment needed to utilize existing and committed transport facilities; air navigation equipment; two new primary road links (Lattakia-Ariha and Hama-Saraqueb); the road betterment program; new secondary and tertiary roads; and lastly, domestic air service.

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149 PN-AAJ-434

ECONOMIC AND TECHNICAL FEASIBILITY STUDY, BUKOMBE-ISAKA ROAD LINK, TANZANIA; FINAL REPORT

Louis Berger International, Inc.
1981, 208 p.

Rwanda, Burundi, and parts of eastern Zaire are now dependent on two transportation routes to the Indian Ocean—a "northern" route through Uganda and Kenya to the port of Mombasa, and a "southern" route across Lake Tanganyika and Tanzania to the port of Dar es Salaam. These routes have become unsatisfactory due to considerable difficulties and delays caused by deteriorating roads, slow rail and port services, and the unstable political situation in Uganda. An alternative "middle" route which crosses Tanzania by road from Rusomo to Isaka and then by rail to Dar es Salaam has thus been proposed. This report examines the economic and technical feasibility of this "middle" route with particular emphasis on the Bukombe to Isaka segment of the proposed Rusomo to Isaka road. The present road from Bukombe to Isaka is 5.5 meters wide and 117.5 km long. It has generally good horizontal alignment, but the vertical alignment is less satisfactory, primarily because long sections of the road tend to flood in the rainy season. Road maintenance is inadequate and bridges and culverts, although in fair to good condition, are narrower than the graded road. Two types of improved road—a new gravel road and a new paved road, both 6.5 m wide, 112.5 km long, and on new alignment—are considered, and economic analyses are conducted assuming both 5% and 7% traffic growth rates. The Economic Internal Rate of Return (EIRR) is relatively attractive (16.0–18.1%) for the paved road, but lower (5.0–8.9%) for a new gravel road since the vehicle operating cost savings from transferring to a new gravel road would be considerably less. A more favorable EIRR for a new gravel road might be obtained if the possibility of upgrading and using some sections of the existing road is considered. This approach may merit further study. Road maintenance improvements, improved rail services, reduction of transshipment time at Dar es Salaam, and provision of an efficient rail/road transfer facility at Isaka will also be necessary if the "middle" route is to provide satisfactory service, and several programs are now underway to accomplish these objectives. Numerous illustrative tables are included, and an appendix provides data on traffic growth and EIRR.

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TRANSPORTATION TECHNOLOGY SUPPORT FOR DEVELOPING COUNTRIES. SYNTHESIS 3: LABOR-BASED CONSTRUCTION AND MAINTENANCE OF LOW-VOLUME ROADS.

National Research Council, Transportation Research Board.
1981, 74 p.

One major deficiency in many developing countries' transport systems is the lack of low-volume roads that generally carry only 5–10 vehicles a day but provide some rural areas with their only link to markets and public service facilities. This report, available in English, French, and Spanish, is part of an AID-funded project to improve developing country access to existing information on the planning, design, construction, and maintenance of low-volume roads. This report's specific purpose is to synthesize—mainly for policymakers in the transportation ministry, planners of road programs and chief engineers in the road authority—existing literature on the meaning, concerns, and use of labor-based technologies in low-volume road construction and maintenance in the context of development. A wide range of labor-and equipment-based construction tools and methods (from hoes, picks, crowbars, and wheel-barrows to bulldozers and mechanized excavators and loaders) are discussed because no construction technology is entirely labor-based but instead spans a full spectrum of human, animal, and mechanical resource combinations. A general evaluation framework is presented to assist policymakers in choosing an appropriate mix of construction technologies which is technically, financially, socially, and economically feasible. An implementation framework is also included which traces the major considerations in implementing low-volume construction projects at both the national (program conception, development, organization, operation and financing) and local (scheduling, supervision, management, monitoring and training) levels. The authors state that the potential for increased use of labor in lower-standard roads is most promising despite the high incidence of capital-intensive technologies throughout the construction industry. Labor-based technology for construction and maintenance of low-volume roads is most favorable when there is a call for projects that are small in scale, geographically dispersed, and technically uncomplicated and when a country's capital reserves are inadequate to purchase construction machinery. Appended is a 29-item bibliography (1963–79).

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e above bring to 25 the number of IRRI research papers nounced in Vol. 9, Nos. 1–4 of *ARDA*.

ner institutional achievements in rice research announced in s issue are those of The Agricultural Development Council in ee reports on Nepal dealing with rice production (082), option of modern rice varieties (080), and changes in income stribution following introduction of modern rice varieties (081)

final paper, item 136, by the Institute of Technology at ndung, Indonesia, describes pyrolytic conversion of rice isks into fuels, the conversion design, and the economic turns anticipated for investment in convertors.

Substantive achievements by research institutions require a long-term institutional commitment as well as the donor backing, such as A.I.D. has provided and continues to provide, which makes this commitment possible. Both the commitment and the support spring from the devotion of research institutions and donors alike to the ultimate goal of development—improving the quality of human life—which is their common raison d'etre. The Report of the Presidential Commission on World Hunger and A.I.D.'s response to it through the TPCA are sober reminders, that for nearly two-thirds of all developing world people, the attainment of this grand goal must begin with the fulfillment of basic human needs, especially the most basic need of all, the need for food.

The Gift of Food.

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